THE IRON TRADE REVIEW

VOLUME XXIV. CLEVELAND, O., APRIL 23, 1891. NUMBER 17.

THE IRON TRADE REVIEW.

A JOURNAL OF THE

IRON AND STEEL INDUSTRY, THE MACHINERY TRADE AND KINDRED INTERESTS

IS PUBLISHED EVERY THURSDAY BY THE

CLEVELAND PRINTING AND PUBLISHING CO.,

27, 29 *and* 31 *Vincent Street, Cleveland, Ohio.*

TERMS, (strictly in advance):

One year	$3 00
Six months	1 50
Three months	75

Advertising Rates Furnished on Application.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER.

CLEVELAND, O., APRIL 23, 1891.

THE WEEK IN IRON CIRCLES.

General Features.

In the midst of the altogether too numerous factors that go to make up the discouraging outlook for the iron market, the increasingly favorable crop prospects continue to be the chief redeeming feature of the situation. It is admitted that, both in condition of crops and acreage, the Winter wheat crop promises better than it has for years. All through the Central West the stand is almost perfect, and similar reports come from the Northwest. Preparations are also being made for a very large acreage of Spring wheat. Nothing can yet be said regarding the corn crop, which runs so heavily into railroad transportation, except that present high prices will stimulate a great acreage. Fruit prospects are also excellent in all sections. Big crops and high prices seldom come together, and the prospects for this rare combination in 1891, gives a firm undertone to everything, in spite of doubts and alarms. The usual monthly reports show that the output of iron is not increasing and the slender stocks on hand are being still further cut down. A careful correspondent notes that it is almost incredible that the production of coke iron in the country should be cut down one-half in four months, but such apparently is the fact. Our Detroit correspondent notes that the situation in the general iron trade is certainly such that it is very difficult, well nigh impossible, to give any interesting report of the condition of affairs, as so very few changes occur. As a contrast, however, to the Chicago market, as reported last week, the Detroit market has seen no break in the price of Lake Superior charcoal iron such as occurred there. Navigation is just on the point of opening, and while the vessel owners at the various lake ports have agreed to hold back until May 15th, or nearly a month, at the same time the line steamships will soon commence the movement of pig iron, with their other freight, from the upper lake region. The transactions which have been of most interest in Chicago market during past week have been certain sales of Lake Superior charcoals. It is reported that several round lots have been placed, aggregating from six thousand to eight thousand tons; this quantity, however, has not been verified. The sales which have been made have been at exceedingly low prices; it is claimed by consumers that figures of $17.00, and in some cases a trifle under this, have been made. Sales which have been booked have been mainly on the part of certain furnaces which have accumulated heavy stocks and decided to move them, notwithstanding the extent of sacrifice necessary. The older and better known brands are at present holding for higher figures. Transactions of considerable size are also reported in the way of local coke brands. Prices on these have ranged low. Southern coke brands have been in small demand and sales in this direction have been light. Foundries continue to report slack business, and that the outlook for much work ahead is uncertain. Buyers at Louisville continue to hold off, stating that they will have no orders for future work; they have confidence, however, that they will appear before those now booked have been filled. A prominent furnaceman, who has a new furnace, and who was in Louisville the past week, says his company will not blow in until the market gets better, and that there is no money in the making of iron at present prices. He thinks that the market is sure to improve soon. Sales ranging from car loads up have been made for prompt shipment and at shaded figures. Iron is being shipped from Sheffield by water to Wheeling and Pittsburgh from the Lady Ensley Coal, Iron & Railway Company. The iron from Sheffield is highly spoken of, and has been in the mixtures of buyers at these points for nearly two years, and is considered of a quality equal to any iron brought into the district. At Cincinnati, the demand continues to be for small lots for immediate use, with occasional transactions looking as far into the future with deliveries, as furnaces can be induced to go. At Buffalo, jobbing foundries are running about half of their full capacity. The specialties such as radiator manufacturing companies, hot water heaters, and stove manufacturers are generally running their works from three-fourths to full capacity. For some reason this latter class of customers anticipate a heavy business, while those depending on jobbing work, manufacturers of engines, etc., are very blue.

The Local Situation.

The embarassments which for some time have hampered the market are about to be intensified by labor complications on a scale which threatens to overshadow all the other questions entering into and affecting the iron ore and pig iron business, and the importance of which cannot be over-estimated. The competition to which the Southern furnaces have during the past year subjected the furnaces in this neighborhood, and which, wherever railway rates have permitted Southern iron to approach the market at all, have proved ruinous to the consumers of Lake Superior ores, has made it plain to everybody in the business that the only way open for a continuation of business must be a sweeping reduction in the initial cost of production, including, among others, that of labor. So it comes that the manufacturing interests would rather see this fight fought out now, and fought to a decisive end, than at any other time. What is wanted, besides a low rate of the cost of making iron, is stability in the cost of manufacture. It is this stability which gives tone to the market, and confidence to the buyer, while it enables the furnacemen at the same time to make long contracts, thus insuring a period of activity and, consequently, of employment to their men. If there is going to be a fight all along the line, there is no time like the present. The sale, this week, of a quantity of four-inch billets, in Pittsburgh, at $24.65, indicates the situation of affairs much better than could be given in a lengthy report, and shows to what straits the makers of iron are driven. It is not to be presumed, however, that there is much benefit accruing to the consumers by reason of these low prices, because the consumption in all the lines seems to have fallen off in proportion with the production, and also because there is hardly anything to sell, either on hand, or for future delivery. Under these conditions a general strike, such as is now threatened, is perhaps the best thing that could possibly happen to the entire iron industry. The men are restive, more so than is usually the case at this time of the year, and appear to suffer from the strike-fever. The coal strike, if it goes into effect, will naturally have a tendency to keep out the cokers, but even if that should be the case, the resumption of activity among the cokers could not well affect the furnaces until the price of coke, along with that of rail freights and several other items, is reduced to meet the views of the furnace interests. The coke producers, on the other hand, talk of $1.75 and even $2-coke, and the railways have not as yet shown much disposition to reduce freights, so that all the indications are against the chances of an early resumption by the furnaces. That the coal strike will, within a week or two after its commencement, shut down the mills as well, there can be no doubt, and, judging from the prices recently obtained for mill products, there is little doubt that the mill men will be satisfied to shut down for awhile. There is no talk whatever of selling ore. The chances seem to favor the forecast made here some weeks ago, viz., that it would not be surprising this year to see vessels go up the lakes with coal and come down light, just as in former years they were rushed up light to come down with ore.

LABOR IN SOUTHERN IRON DISTRICTS

Mr. Charles Himrod, of Chicago, well known to the pig iron trade, in a recent interview gives expression to the following statements regarding the present status of labor in the Southern iron districts:

I should say that labor in the South costs 25 or 30 per cent. less than at the North. In Tennessee and Alabama they use convict labor in their coal and their ore mines, and, I think, about 40 cents per man per day is what they pay the State for it. I do not know what proportion of their work is done by convict labor, but as the amount of work done increases, the proportion of course keeps growing less. Negro labor, of which they use a great deal, is very cheap. They do not pay more than about $1 per day for it. As about 90 per cent. of a ton of pig iron is labor, a difference to that extent is of very great advantage to the South. An additional advantage is that negro labor is very docile and easily managed; the greatest difficulty with it is that the blacks will not work steadily; they are very anxious for vacations and holidays, but while they do work their labor in the mines and at the blast furnaces is just as good as a white man's.

In answer to the question, "Does there seem to be any immediate prospect of an advance in the cost of labor?" he replied:

It is bound to increase before very long. One thing that is keeping it back now is the refusal of the white men to take black men into their unions. I understand that they refuse to allow their organizations to be used for the benefit of the negroes. In time that may change. Then labor is becoming scarcer, and it will be necessary before long to import it. They cannot get men to go there from other parts of the country unless they pay the same wages that are paid elsewhere. As soon as they are compelled to import men the rate of wages will go up to the level of the rest of the country. And it is only a question of time, I think, when convict labor will be stopped.

It seems to us that this will be the entering wedge that will bring about a readjustment of relations between the two rival sections more than anything else. That wages in the South are abnormally low there can be no doubt As labor in that section improves its condition, wages must rise; and, as a logical sequence, the cost price of pig iron must advance. If to this we add a lowering of freights and materials in the North, which is equally sure to come, the conviction follows that the present wide divergence between the North and South as trade competitors must soon come to an end.

CANADIAN CRITICISM OF BRITISH FREE TRADE.

"Will England Return to Protection?" pertinently asks the *Canadian Manufacturer*, in a very able article, which we reproduce elsewhere. Answering its own question, the *Manufacturer* proceeds to show that, in the very nature of things, Great Britain is debarred from negotiating favorable commercial treaties with other countries, and, as a consequence, the United States is "forcing" reciprocal arrangements with other American governments that are as decidedly to the advantage of the Yankees as they are adverse to the interests of the Mother Country. More than this, it is also quite apparent that Great Britain is beginning to depend upon other countries for some of her supplies, and (hear it, ye shades of Cobden and Bright!) the very countries upon which she is thus depending are the most highly protected nations in the world.

It is not strange, therefore, that our Canadian contemporary should raise the question referred to, especially in view of recent significant expressions by Lord Salisbury and the London *Times*, quoted in its article. The dogged conservatism of British officialism may delay the overthrow of the Free Trade fallacy, but with two or three of the most prosperous among her colonies adopting trade regulations in close imitation of the American tariff, and planning for a still wider application of the protective principle, the doom of the Cobden theory would not appear to be so far distant as many economists might suppose.

THE SOUTH'S PRODUCTION OF IRON ORE.

Summarizing in the *Manufacturer's Record* a few of the footings of the eleventh census, as thus far made known, Mr. Robert P. Porter submits the following table showing the production of iron ore in the Southern States for the last two decades:

States.	Census of 1880.	Prod'n of 1890.
Alabama	171,130	1,565,321
Georgia and North Carolina	84,503	248,538
Kentucky	56,865	77,187
Maryland	127,102	29,380
Tennessee	93,272	473 294
Texas	3,214	13,000
Virginia and West Virginia	217,448	510,719
Total	754,614	2 917,529

In 1870 the total production of iron ore in the United States was 3,163,839. In 1890, as will be seen, the Southern States produced 2,917,529 tons, or only 246,310 tons less than the entire output of twenty years ago. At the same time it should be remembered that the total production of iron ore in the United States in 1889 [statistics of the American and Steel Association] was 14,950,000 tons, of which amount the Lake Superior region produced 7,292,754 tons, or fully one-half of the given aggrevate. Estimating the total production of 1890 at 16,000,000 tons it will be seen that the South's proportion, though very large in comparison with its record of 1870, is still only about one-fifth of the grand aggregate. We do not call attention to these facts by way of disparagement of Mr. Porter's article (which is a just and able estimate of the wonderful progress of the South during the past decade) but simply to show that comparisons are only valuable when taken in proportion to their wider and more comprehensive relations.

CUT NAIL MANUFACTURE IN THE OHIO VALLEY.

Through numerous letters from subscribers and others our attention has been called to an article contributed to these columns, in the issue of March 26, by a traveling correspondent temporarily in our employ, concerning the manufacture of cut nails in the Ohio Valley. Anxious only to print the facts, we promptly dispatched a second representative of this paper to Wheeling, and the result of his inquiries convinces us that the article in question (though vouched for by the correspondent at the time) was inaccurate, unjust and in extremely bad taste. The prompt discharge of the offending party, and the present disavowal of any intention to do injustice to the nail manufacturers of the Wheeling district, will not, we are aware, fully atone for the injury done by the article, but this much we do, and that the more cheerfully, since we have never knowingly allowed the columns of *The Iron Trade Review* to be the vehicle of abuse, sensationalism, or misrepresentation.

Our representative was courteously shown through a couple of the largest of the Wheeling nail mills, and was given the utmost facilities for inspecting the methods for manufacturing, packing and shipping. The advancement that has been made within the past ten years in the machinery and methods of manufacture of these nails need hardly be spoken of, as everybody knows that the cut nails that are made in the Ohio Valley stand second to none in the country. One of the most important of these mills is the La Belle Iron Works, of Wheeling. The representative of this paper, who was kindly shown through this mill by Mr. Robinson, the president of this company, found that the La Belle Works occupy a tract of ground of about 15 acres, on which they have erected six different buildings for the manufacture of cut nails. They employ an average of 200 men, and they have 175 different sizes of machines for the manufacture of cut nails, from the largest spike down to the very smallest nail. The entire output of this mill for the year 1890, was over 300,000 kegs, of 100 pounds each.

The precautions that are used in the manufacturing, packing, and shipping are something marvelous. Take, for instance, the room in which these nails are made. In front of each machine is a large box about 4 feet square and covered with iron. As soon as the nails are made, each nail goes into its respective box. After the nails have been inspected, they are run through a machine by which all the dirt and scrap are taken off. They are then put back in the box and packed from there. The packers find it to their advantage to save all the scraps that accumulate in the boxes, as they secure 25 cents extra a keg for all the leavings they take from their boxes. Not only this, but every keg is marked; and if a box of nails should be returned to the manufacturers (and Mr. Robinson stated that he has only known one keg to be returned in ten years), it can, of course, be traced right to the man that packed it, and his services immediately dispensed with.

Not only do the La Belle Iron Works have this method, but the Riverside Iron Works, the Bellaire Nail Works, and Belmont Works, in fact all concerns in the nail business in the Ohio Valley. A much greater space might profitably be employed in going into the details of the manufacture, assortment and shipment, but the above will suffice, perhaps, to show that the utmost care is exercised throughout. Nothing observed by our representative carried out in the slightest degree the impression that any other than the most careful and honest methods prevailed; and, indeed, the high character of the men engaged in the business should be a sufficient guaranty in this repect.

WILL BRITAIN RETURN TO PROTECTION?

The Toronto *Globe* produces a long editorial to prove that Britain cannot and will not enter into a zolverein with her colonies as against the rest of the world by the establishment of a discriminatory tariff, capping its argument with the assertion: "Not only would the people of Great Britain have to be content with dearer supplies [should such a zolverin be formed], but they would imperil a trade of £554,000,000, the present amount of their foreign commerce, for the sake of a possible increase in a colonial trade of £184,000,000;" quoting what Sir Thomas Farrer said, that "England is surely not the dog to drop the meat in order to snap at the shadow." It reminds us that Lord Salisbury had said that any form of protection (in Great Britain) augmenting the price of food would bring about a state of things scarcely distinguishable from civil war.

The Premier of Great Britain is no doubt a firm believer in the correctness of the theory of universal Free Trade as ever Mr. Cobden was, and he may hope as fervently that he may live to see the realization of that theory; but it is evident his Lordship sees and understands that universal Free Trade is much farther off in the dim and distant future than what Mr. Cobden thought it was, when he predicted 50 years ago that within ten years all the important mercantile nations of the earth would have adopted Free Trade.

Transpiring events are object lessons that bear directly on the question. Lord Salisbury may be viewed as the standard bearer of Free Trade; and we may enquire what advances that theory has made outside of Great Britain since it was inaugurated 50 years ago. The answer is, that while Great Britain has clung to it with great tenacity and perseverance, there is now no other

important nation that entertains it. It has been abandoned for protection; and we see that under the benefits of protection France and Germany are sharing largely in a trade that was once under the entire control of Britain, even invading the British home market and creating havoc and consternation among British manufacturers, and the utmost distress among British workmen. Lord Salisbury has no power, under Free Trade, to relieve this terrible state of affairs.

On the other hand, Mr. Blaine, backed by the power of American protection, is forcing other nations to make terms with him by which they will receive American products on better terms than Lord Salisbury can hope to obtain for his country. Mr. Blaine forces Brazil to adopt a schedule of very low duties as applied to certain American products, in consideration of the United States admitting Brazilian sugar, coffee and hides free. If Brazil had declined to accede to this arrangement the United States would have imposed very heavy duties upon Brazilian products, and Brazilian producers would have had the burden on their shoulders. Lord Salisbury does not have it in his power to effect any such diplomatic feat. Spain has heretofore insisted that Cuba should levy high duties upon all but Spanish flour. The United States is the natural source of supply of flour for Cuba. Cuba is a large producer of sugar and tobacco, and the United States has heretofore taken about all the sugar Cuba had to sell, and a large proportion of her tobacco. Mr. Blaine gives Cuba the alternative of admitting American flour and other products on more favorable terms than heretofore, or of having her sugar and tobacco excluded from the American market. Spain does not like this condition, but what is she going to do about it? Heretofore Spain supplied Cuba with nearly all the flour consumed there; and the duties upon such merchandise as Cuba received from the United States constituted a very large part of the revenues of the Island. Spain does not consume Cuban sugar, heretofore the whole output going to the United States. Brazil, too, is a large producer of sugar, but under the recently arranged reciprocity between that country and the United States, the latter country admits Brazilian sugar free; and unless some reciprocal arrangement is made with Cuba sugar from that island will continue to pay a duty of about 2¼ cents per pound. Cuba must have a market for its sugar, and whether Spain likes it or not, or whether Cuba likes it or not, Cuba will be forced to modify its tariff affecting American flour and other products to save its sugar interest from destruction and the people from revolution. Lord Salisbury could never have forced such an arrangement in favor of Free Trade Britain; and Mr. Blaine could not have forced such arrangement if the United States had not entertained a high tariff policy.

That the manufactured products of protection countries are making painful inroads even in Britain upon the business of British manufacturers, is evident from the British Board of Trade returns for February, wherein, although the imports showed an increase, the exports showed a serious reduction. The imports amounted to £33 311,000, an increase of £2,293,000, or about 7½ per cent., and the exports to £20,471,000, a decrease of £614,000, or about 3 per cent. The increased value of imports was largely due to cereals and raw cotton, while the imports of jute and raw silk showed a heavy decline. On the other hand, the imports of manufactures of cotton were increased by over 10 per cent, the receipts for the month being valued at nearly a quarter million sterling, a state of affairs well calculated to cause anxiety in Nottingham. The imports of woolens were not inconsiderable, the receipts being valued at £645,773, a condition which Yorkshire certainly cannot view with equanimity.

This is protection bearding the British free trade lion in his den; and these importations into Britain of cotton and woolen fabrics are from the most highly protected countries—France, Germany and the United States. At a recent meeting of the Associated Chambers of Commerce, held in London, Lord Salisbury stated that remonstrances addressed to foreign governments regarding what he termed "hostile tariffs," only confirm them in their hostile intentions. "This matter of commercial tariffs," said the Premier, "is singularly unfitted for the exercise of the magic spell of remonstrance and objurgation, of which the people of this country are so fond. The object of a foreign power in raising its tariffs is to exclude your commodities, and when you tell them in reproachful tones that the effect of their policy will be to exclude your commodities, the only result is that they say, 'Thank you, that is just what I intended,' and they give another turn to the screw of the tariff, in order that the effect may be quite unmistakable." And while deprecating remonstrances, as being certainly futile and probably harmful, Lord Salisbury emphatically declares that "we have no means of influencing the course of events," in regard to foreign tariff legislation. "This country," he said "has decidedly renounced, as far as the opinion of our leading commercial men may enable us to judge, every idea of influencing the fiscal action of foreign countries by any modification of our own fiscal policy. Taking that fact as a starting point, you may say we have no means of influencing the legislation which other countries may think it right to adopt."

This looks like a confession of inability to cope with existing circumstances, and also a dogged determination not to yield to the inevitable. The London *Times* alluding to the situation, says: "Other nations will not give us something for nothing, nor is it reasonable to expect it. Wisely or foolishly we elected to denude ourselves of the power of offering them a fiscal *quid pro quo*, and to trust entirely to the force of example and the inherent power of our free trade principles. Having nothing to offer in return for favors, it is idle to beg other nations to refrain from what they think profitable, merely because it is disagreeable to our manufacturers," and this is the correct view.

In the adoption of her free trade policy Britain denuded herself of the means of making bargains with other nations, and the only thing left for her to do is to take up the weapon Mr. Cobden threw aside. She cannot be prevented from doing so, and did she again adopt some system of protection, she would be equipped with an armament that would force such ultra legislation as the McKinley bill to be quickly cancelled.

Protection means commercial power.—[Canadian Manufacturer.

CONDITION OF THE BLAST FURNACES OF THE UNITED STATES.

April 1, 1891.

[CONDENSED FROM THE AMERICAN MANUFACTURER.]

LOCATION OF FURNACES.	CHARCOAL. Total No. of Stacks.	CHARCOAL. In Blast. No.	CHARCOAL. In Blast. Week'y capacity.	CHARCOAL. Out of Bl'st. No.	CHARCOAL. Out of Bl'st. Week'y capacity.	BITUMINOUS OR COKE. Total No. of Stacks.	BITUMINOUS OR COKE. In Blast. No.	BITUMINOUS OR COKE. In Blast. Week'y capacity.	BITUMINOUS OR COKE. Out of Bl'st. No.	BITUMINOUS OR COKE. Out of Bl'st. Week'y capacity.
New England	14	7	648	7	579					
New York	9	1	94	8	1,017	6	4	3,831	2	1,601
Pennsylvania	14	3	248	11	841	1	0	0	1	600
Upper Susquehanna Valley										
Pittsburgh						25	12	17,330	13	15,616
Spiegel						1	0	0	1	830
Allegheny Valley						1	0	0	1	930
Shenango Valley						17	2	1,840	15	11,546
Youghiogheny Valley						4	0	0	4	2 838
Juniata and Conemaugh Valleys						19	7	2,614	12	6,770
Maryland	7	1	111	6	555	3	1	1,411	2	1,487
Virginia	11	1	39	10	629	14	8	4,060	6	2,849
North Carolina						1	1	100	0	0
West Virginia	2	0	0	2	130	6	0	0	6	3,606
Ohio—Mahoning Valley						15	4	3,403	11	9,370
Eastern, Central and Northern						17	8	5,543	9	7,348
Hocking Valley						14	3	1,030	11	2,958
Hanging Rock	12	2	148	10	989	14	10	2,284	4	740
Miscellaneous										
Kentucky	1	0	0	1	95	5	3	897	2	720
Hanging Rock										
Western Region and Miscellan'ous										
Tennessee	7	2	624	5	825	12	8	4,023	4	1,538
Georgia	3	0	0	3	379	2	1	525	1	675
Alabama	14	5	1,249	9	1,930	38	20	13,235	18	11,722
Indiana						2	1	126	1	278
Illinois						14	2	2,515	12	11,858
Spiegel										
Michigan	23	13	4 185	10	3,294					
Wisconsin	5	4	1,894	1	120	4	1	940	3	1,935
Minnesota						1	0	0	1	140
Missouri	2	0	0	2	627	5	0	0	5	3,764
Texas	3	2	535	1	306					
Oregon	1	1	280	0	0					
Colorado						2	1	461	1	350
Utah										
Washington	1	0	0	1	205					
Total charcoal and coke	129	42	10,055	87	12,522	243	97	66,168	146	102,069
Total anthracite	162	92	37,093	70	22,622					

SUMMARY.

FUEL.	In Blast. Number.			In Blast. Weekly Capacity.			Out of Blast. Number.		Out of Blast. Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	42	50	51	10,055	10,204	11,167	87	80	12,522	12,025
Anthracite	92	93	121	37,093	37,514	49,713	70	69	22,622	22,450
Bituminous	97	107	174	66,168	73,027	126,676	146	135	102,069	88,191
Total	231	250	346	113,316	120,745	187 556	303	284	137,213	122,706

SOMETHING ABOUT FUEL GAS.

At the seventh annual meeting of the Ohio Gas Light Association, Mr. George H. Christian read a paper on the "Present Outlook for Manufactured Gas." We take pleasure in laying before our readers a few points there from:

"The use of natural gas has given a great impetus to the demands by the people for fuel gas, yet the experience had in the burning of natural gas by the very wasteful methods now employed, will hinder rather than advance their chances for obtaining the manufactured article.

"On account of the large amount of capital invested in the illuminating gas business, it devolves upon these companies to utilize their present plants to convey gas for fuel as well as light, and they must take the initiative in this movement. Let the manufacturers of coal gas and carbureted water gas combined calculate the cost of their gas in the holder per 1,000 feet for material, labor and repairs, in any section where gas coal can be had for $3 per ton, and Lima naphtha for three cents per gallon. The gas made will be 19-candle value, and contain 750,000 units of heat. I believe I do not err when I say that the present cost for distribution, interest, taxes, etc., does not exceed the cost of gas in the holder in any works the bonded debt of which is not excessive; and it should be remembered that by doubling the amount of gas sold you should reduce the distribution cost more than one-third.

"Natural gas companies are selling gas for 15 cents per 1,000 feet. Interest, taxes, distribution, improvements and repairs must amount to six or seven cents per 1,000 feet, leaving them a profit of from eight to nine cents. This sum has been ample to pay large dividends, and set aside a surplus. Allowing ten cents, per 1,000, profit to illuminating gas companies on their sales of gas for fuel purposes, at what rate can they afford to sell such gas?

"Suppose, for the sake of an example, that some company should be so favorably situated as to feel warranted in making this rate 50 cents per 1,000. Can the consumer afford to pay this price for gas for heating and cooking? Natural gas as now wastefully burned is, at 15 cents per 1,000, equal in price to hard coal at $3 per net ton. When we can burn coal gas with a total efficiency of 65 per cent., 15,000 cubic feet of it will do as much heating as 20,000 cubic feet of natural gas now does. Coal gas, then, at 50 cents per 1,000 would equal hard coal at $7.50 per net ton. This is so little in excess of the cost of hard coal fuel, when we consider the cost of removing the ashes and dirt, that I believe its general use as a fuel at that price could be assured."

THE North of England ironmasters have given notice of a 12½ per cent. reduction of wages, alleging that the cost of production exceeds the market price by $1.25 per ton.

THE MANUFACTURE OF WAR MATERIAL IN AMERICAN WORKS.

BY S. W. G. BENJAMIN.

We find at South Bethlehem, Pa., one of the largest iron-work establishments in the world, rivaling those of Manchester, Le Creusot and Krupp. The company gives employment to nearly 5 000 men, and owns property along the picturesque banks of the Lehigh river, about one and a half miles in length by a quarter of a mile in width, of which some 20 acres are under cover. The river itself has recently been deflected out of its course where the works lie, in order to make space for some of the buildings, and to shift the Lehigh Valley Railroad to one side, as it has hitherto bisected the works, to the peril of those employed there. Besides the immense boiler houses, engine houses, puddle mills and merchant steel mill, there is a great Bessemer department built of stone, having an iron and slate roof, not less than 1,512 feet long and 111 feet wide. In the upper transept is the blowing machinery, worked by, and consisting of, seven large engines. Numerous other buildings bewilder the visitor by their immensity, and the complicated character of the wonderful mechanisms which enter into the manufacture of iron and steel fabrics.

But the buildings especially erected for the production of war material demand particular attention as offering more to interest than any of this sort yet built in this country, and perhaps in the world. These buildings are formed of iron filled in with brick. The machine shop is 641 feet in length, and contains drilling machines, lathes, boring mills, shapers and the like. Perhaps the most impressive of the devices one sees there for hewing steel, apparently with the ease with which one whittles soft pine with a jack knife, is the great planer, capable of smoothing a steel casting 13 feet by 13 feet by 50 feet and 10 inches. The traveling pneumatic cranes, which move overhead on an aerial railway, are 60 feet span and can carry 100 tons. This, as well as the other buildings, is in direct communication with the railway.

The casting and forging presses were manufactured by Sir Joseph Whitworth & Co., at Manchester, Eng., and are located in the vast forging and plate mill, which is about 1,100 feet long and 175 feet wide. This department has never been surpassed for shaping metal and forging war material. Tubal Cain would open his eyes were he to behold the line of furnaces capable of casting ingots of 100 tons. The technical word ingot, a term associated in the public mind with blocks of gold and silver, is applied at the iron works to castings of steel before they have been reduced to their final shape and polished. A shaft intended to be 50 feet long, or a gun that is to be 35 feet long, is cast in circular blocks, perhaps one-third their ultimate length, and, of course, much thicker than when completed. By forging and boring, the ingot is finally carried out to the intended proportions.

The furnaces are heated by coal gas. As the molten metal approaches the condition required for casting, specimens are taken out in small ladles and poured into moulds. Immediately on hardening it is broken, and the character of the grain indicates the condition of the fused metal. The furnaces are elevated on an iron platform about 15 feet above the ground. When all is ready a large vessel fixed on rails, and singularly called a ladle, is placed below the furnace. At a blow of a hammer a valve is opened, and in an instant a torrent of liquid fire, flinging a shower of sparks far around, roars down a channel and fills the ladle with many tons of boiling metal. By hydraulic action the ladle is moved forward until it comes directly over the mould in which the ingot is to be cast. Many pieces of exceptional shape are cast in moulds of sand, according to the usual methods. But in the process described here a permanent mould of iron is used lined with fire-brick. The workmen, by striking an iron bar through the stream of iron fluid as it drops into the mould, starts showers of sparks, which ignite the escaping gas, and the outside of the mould is thus wreathed with rows of burning jets of flame.

When one ladle is emptied another takes its place until the mould is nearly full. After this is accomplished the ingot is subjected to one of the most tremendous processes to be seen at these extraordinary works. The mould is drawn under a hydraulic press, which is intended to squeeze out all the gas and reduce the cast to the very last degree of condensation and closeness of grain. When the press strikes the molten iron flakes of fire are forced up that fly 40 or 50 feet, and the bystanders must keep clear of the burning missiles. This press bears down with the stupendous power of several thousand tons.

After the ingot is cast and sufficiently cooled it is carried by rail to the forging shop, and placed, by the aid of a mandril, in a furnace of coal gas and heated to a white heat. When sufficiently hot this dangerous mass is placed upon a hydraulic forging press. The handling of this fearfully-heated block is done by hydraulic power with such apparent ease that one fails to realize at first the marvelous character of the operation. While in this state, red-hot and soft, it is turned and moved backward and forward by means of a mandril, and is brought into the required shape by the press. Thus an ingot 15 feet long may be pressed into a flat plate 40 feet long or a shaft or gun 36 to 50 feet in length. This is necessarily a slow process, and often the ingot requires to be reheated.

The forging of the immense guns is a most interesting process. The rifled guns of the present are made by re-enforcing the tube with rings and repeated layers of steel called jackets, which are fitted one over the other over the original tube or barrel of the gun. The jackets or hoops must fit as closely to the gun as if forming an integral part of its composition. The only way to get them on is, of course, by heating, and thus enlarging them. When they cool they fit snugly. It is evident that the exact size of the jacket and ring when heated so that it can be put in its place must be a matter of the nicest mathematical calculations. The coarse powder now used makes such havoc with the rifling of the largest guns that 100 charges are about all that can be expected from them. The jackets and rings can then be removed and fitted to another tube. The various parts of a gun are not put together at Bethlehem, but are sent to Washington, to a department of the arsenal called the assembling room, where the tube is rifled and the gun is finally completed. A steel gun of the largest calibre costs about $100,000.

A recent invention now in practice at the Bethlehem iron works is making hollow shafts for ships of war. Formerly the shaft was made solid; but it has been found that equal strength can be obtained with a shaft that is lightened by taking out the core.

When the shaft or gun is finally shaped it must be tempered and annealed. A separate building is assigned to these processes. The shorter pieces are brought up to the requisite heat for tempering in a gas furnace; the longer pieces are heated in a perpendicular furnace, having a narrow door of brick and iron that weighs 15 tons. An immense hydraulic crane, with a capacity of 100 tons, lifts the piece of heated metal and plunges it into a vat of oil some 50 feet deep. A sheet of flame shoots up when the oil feels the hissing metal, but ignition is prevented by a stream of cold oil, which pours in as the heated oil passes off. In any case it is necessary to use oil of low inflammable power, requiring at least 600 degrees of heat to ignite it. In Europe colza or rape-seed oil is used, but in this country it is cheaper to use cotton-seed oil. After tempering or hardening, the metal, if found too hard after testing, is placed in annealing furnaces, where it is tightly inclosed in a wood fire. The quality and temper of the metal as it passes from process to process are constantly tested by the excision of small sections, which are carefully examined by a resident board of Government inspectors, consisting of two officers from the army and two from the navy. Specimens are also sent to Washington.

The hammer shop, now in process of completion, will probably be regarded as the most interesting object of South Bethlehem, and perhaps more remarkable for evidence of power than any mechanical contrivances yet constructed by man. It is here that the plates are to be prepared for our growing navy. This building includes furnaces and a vast tank for tempering the plates. They will be lowered into it by traveling cranes. The tank is divided into compartments, enabling several plates to be treated at once.

The hammer is, however, the most marvelous object in the hammer shop. It was designed by Mr. John Fritz, chief engineer and general superintendent, who has been connected with the works from the beginning, and has invented or improved many of the appliances in use at South Bethlehem.

In the designs for the hammer proper Mr. Fritz consulted the plans of Le Creuzot, following them as far as they met the conditions of construction already adopted. The entire foundation of the hammer room is actually laid on what two years ago was the bed of the Lehigh river, which, as we have said, was deflected from its course, and the anvil and hammer frame rests on piles. Above these a mass of cyclopean masonry has been built, and upon that the anvil is superimposed, consisting of a bed of solid iron capped by a bed of steel. This anvil represents the trifling amount of 1,400 tons of solid metal. Over the anvil springs the colossal frame which supports the hammer. This frame bears a certain resemblance in shape to a truncated tower of Eiffel. It springs to a height of 90 feet from a spreading base, whose foundations are clamped deep in the earth. This huge structure contains 475 tons of iron.

The tup of the hammer is a square, solid block of iron faced with steel. It runs in a groove, like the hammer of a pile-driver, is raised by steam, and has a hoist of 18 feet. It weighs 125 tons. The total weight of iron in this stupendous hammer, frame and anvil reaches the enormous sum of 2,000 tons.

It is with this mighty engine that the armor plates of our ships of war are to be forged. The best plates hitherto made have been those of Schneider & Co., of Le Creuzot, in France. The English armor plates are composed of a backing of iron faced with steel; the difficulty with these plates is in the proper welding together of the iron and the steel. The Schneider plate, on the other hand, is a homogenious ingot of admirably tempered steel, containing about 0 4 per cent. of carbon, the outer surface being slightly harder than the inner surface.

The Bethlehem Iron Co. has thus far supplied the shafting and ordnance for the cruisers San Francisco, Newark, and Philadelphia, and is now engaged in turning out similar appliances for the Maine, Amphitrite, Puritan, Texas, Monadnock, Terror, and a large number of other vessels.—[Harper's Weekly

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The Cleveland Vapor Stove Trade.

The Cleveland vapor stove manufacturers are turning out more stoves than ever before, and report a steady increase in their use throughout the country. The impression prevails in some quarters that the consumption of vapor stoves is either about stationary or else diminishing. This opinion is to a considerable extent based upon the fact that the coal stove makers have very generally abandoned the sale of vapor stoves, and as thousands were formerly distributed annually through coal stove salesmen, the presumption would seem to be well founded that an important outlet had thus been cut off whose absence would be felt. But this is stated, by those in full possession of trade statistics, to be incorrect. The increase in the number of vapor stoves made and distributed last year was fully 25 per cent. over the preceding year, yet the quantity "jobbed" by coal stove makers had shrunk considerably from its former proportions. This year, with the trade confined still more closely to the actual manufacturers of vapor stoves, it is believed that another very great increase will be made. The enlarged facilities provided by some of the manufacturers are being drawn upon to their full extent to meet the present demand, so that lack of heavy orders from the coal stove men is not perceptible. The indications now are in favor of an unusually large trade in high stoves. Last year the increased output was mainly in juniors, which are the missionaries of the trade, leading almost invariably to the introduction of more expensive constructions. It is a curious feature of the withdrawal of coal stove makers from the vapor stove field that both sides seem thoroughly well satisfied with the change thus made. The vapor stove manufacturers think their trade will be in better shape and will be handled more satisfactorily hereafter, while the coal stove men are glad to get rid of a business so foreign to their own legitimate line.—[Metal Worker.

LAKE SUPERIOR MINING NOTES.

VERMILION AND MESABA RANGES.

The first ore train of the season, loaded with 400 tons of the Minnesota product, pulled out of the Duluth & Iron Range yard, Monday afternoon, bound for Two Harbors, the shipping port of the greatest hard ore district in the world. Four regular trains are now running and filling the ore docks, which will accommodate 40,000 tons, or about 100 trains. F. M. Cardwell, chief clerk at the Minnesota offices, informs us that at the close of work, Saturday night, the mine had 203,662 tons of ore in stock, over 80,000 tons of which is the product of No. 5 shaft, at present the most productive portion of the mine. This was about the amount in stock at the commencement of shipping a year ago, but as the company that year carried over a small quantity from the previous season, the output for the past Winter has been larger than that of '89-90. The stockpiles of the Chandler mine contain 134,170 tons, and the daily output is about 1,000 tons. No sales of Vermilion ore have as yet been made, except a small quantity of the Minnesota to the Ashland Iron & Steel Co. Vessel rates of $1 from Two Harbors are rumored, but it is not probable that shipments will begin, before the middle of May, and possibly not until June. —[Vermilion Iron Journal, Tower, Minn., April 16.

MARQUETTE RANGE.

At the U. S. Grant mine they are now drifting south in the hopes of striking something of value. They have exposed considerable ore, but it is somewhat mixed.—[Iron Ore.

At the Fitch mine they will sink another lift, the showing in the present bottom of the mine warranting that expenditure of labor and capital. The ground shows more uniform and regular in the bottom, and it is thought that something good may be found by sinking deeper—[Iron Ore.

Mr. W. Davis, agent of the Grand Rapids mine, Negaunee, was in Ishpeming, the other day. He reports the mine looking well, but that a considerable reduction in mining force was made on the first of the month. This was due to the fact that all the stockpile room had been filled, and that a living price could not be secured for the ore. Offers had been made for 45,000 tons, but at a price that would be less than the ore cost to place on surface, so that no sale was made. The company wisely decided to remain moderately quiet until it can dispose of its stock at a profit.—[Iron Ore.

In the extreme eastern end of the Dexter mine they have struck ore much resembling that of the American mine, but enough has not been done to give an idea of its value. Capt. Harper had a sample he was exhibiting the other day. It would give about 67 per cent. in metallic iron, probably, and was the first of the kind ever found in the mine. A large deposit of ore of this quality would be a good thing for the Dexter, and we trust they will show up one. The mine has let out a number of its miners within the past few days owing to the failure to make sales for this season's delivery, and the further fact that the stockpile room is all occupied.—[Iron Ore.

The Pittsburgh & Lake Angeline Co. have evidently struck a large deposit of ore at their exploration at the east end of the lake. The drift being run from the bottom of the shaft at that point encountered ore at 70 feet southwest of the shaft The miners are now into the ore a distance of 12 feet, and there is every indication that a good mine will be developed. The ore is a dark blue, gives 65 50 in metallic iron and .014 in phosphorus, a most desirable product.—[Iron Ore.

An ore body was encountered last week by the diamond drill at the Lakeside 200 feet from the surface, and up to last report some 25 feet of it had been passed with the drill still in ore. Though no analysis has been taken it is evident the ore is of good quality. It is a hard hematite, and good judges express the opinion that it is as high as 65 in iron.—[Negaunee Iron Herald.

During the past few days Supt. Philbin, of the D., S. S. & A. road has visited every mine of the county with a view of obtaining orders for cars, and failed to secure an order at a single mine. The managers of only one—the Lake Superior—thought it likely that cars would be called for during the current month. At the corresponding season of former years the demand has been active, the disclination to ship from the overcrowded stockpiles at this time is certainly a very discouraging feature of the present situation, and is altogether suggestive of the greatest depression in the market.—Negaunee Iron Herald.

MENOMINEE RANGE

The Penn Iron Co. will get out as much ore this season as it did last, and will begin shipping as soon is the ice is out of the way. The second drill hole on the town site of Quinnesec is in the ore.—[Current, Norway.

Messrs. J. N. Porter and Ed. Coon have bought into the McCuster-Smith-Weller property, located near the Mastodon mine. A company has been organized under the name of the Brule River Iron Mining Co., and the valued property will be given thorough development. Twenty thousand shares of stock will be placed on the market at once.—[Diamond Drill, Crystal Falls.

Capt. James Tobin has discontinued explorations near Stambaugh, in the locality known as Spring Valley. Work was carried on several months but the prospects of finding a paying deposit of ore did not better.—[Diamond Drill, Crystal Falls.

The Ludington people are now hoisting, on an average, 500 tons of ore per day. The shipping season at this mine has opened, and about 500 tons a day are being sent to Gladstone. Last week they sent another consignment of ore to Alabama.—[Menominee Range.

At the present time about 2,000 tons of ore is broken up and ready for hoisting from the third level of the Millie mine. It is possible that the engines will be started, and a quantity hoisted to the surface in order to relieve the timbers which are now sustaining a great weight. If no hoisting is done, some additional supports will be put under the timbers in order to insure safety.—[Menominee Range.

Owing to the large amount of surface water, work has been temporarily suspended on section 8, 39-19, at Spread Eagle. Mr. Minnis informs us that a stock company will be formed in the course of a few weeks. The shaft which these people are sinking on this property has reached a depth of 30 feet, and is bottomed in ore which averages 54 per cent. in metallic iron.—[Menominee Range.

The diamond drill hole which is being sunk from the bottom of C shaft of the Millie mine, has reached a depth of about 90 feet, and during the entire distance has been driven through slates, jasper and sandstone. On the foot wall side at the third level these people are sinking a winze, which has reached a depth of 68 feet and will be extended to 100 feet. The winze has been sunk through ore all the way, and opens up a large amount of stoping ground.—[Menominee Range.

The Pewabic people have started again to open up the third level, and have about 50 feet farther to go before reaching the ore body, this making a total distance of 600 feet from the shaft. The large volume of water which was tapped on this level causes not a little trouble, and to facilitate work it is necessary to use very powerful pumps—[Menominee Range.

Concerning the mines of the Penn Iron Co. the Norway *Current* says: At East Vulcan, the drift from No. 3 struck the ore at a distance of 125 feet, and a crosscut in the ore, towards the hanging is 20 feet, and no hanging yet in sight. At the seventh level of the new shaft, the drifts in the ore have been extended east and west about 415 feet, and the ore still holds out. The shaft at Southeast Vulcan, is again being sunk. At West Vulcan, the new shaft is about 585 feet deep, the drift at the sixth level has again been started, and it lacks but 30 feet of a connection with the crosscut. The winzes from the fourth to the fifth level are going down at a fair rate, but one of them has struck rock and mixed ore at a depth of 65 feet. The western drift on the fourth level is in 250 feet from shaft and in ore. This brings the ore body at least 30 feet beyond the point reached in the level above. The stock piles at these mines aggregated on April 1st about 75 tons. The drift from the bottom of the Briar Hill exploring shaft is in 178 feet, and the air will be used in driving it as soon as the pipes are laid.

Rules for the Use of Petroleum as Fuel.

In the course of an interesting illustrated lecture upon the subject of petroleum as fuel, delivered recently by H. K Lindsay, of Cincinnati, general agent of the Central Department of the Lancashire Insurance Co., before the Insurance Library Association, of Boston, he suggests the following rules for the use of oil for this purpose, so as to secure the greatest measure of safety from the chances of fire:

For crude petroleum: First.—Storage tanks, except for daily use, must be located at least 100 feet from building, provided with embankment or wall to prevent, in case of leakage, the flow of oil toward buildings; underground tankage being preferable for safety and economy, may be within 50 feet. Second.—For daily consumption, permit to be given to have iron tank with close iron top, having a safety pipe of not less than one and a half inches in diameter, and ten feet high, to allow escape into open air all accumulation of gas, the capacity in no case to exceed five barrels for each boiler, and may be located immediately outside of boiler house. If 25 feet outside, tank may be open. Third.—A stop-cock in all cases to be placed in supply pipe where pipe leaves tank, that in case of accident to the pipe the supply can be shut off at the tank. At the boiler the supply pipe should be supplied with a stop-cock, with an opening not larger in any case than three-sixteenths of one inch in diameter, so that under no circumstances could the flow of oil under the boiler be greater than could be consumed, thus preventing an overflow from flooding the fire-box or arch with oil. Fourth.—A perfect combustion requires that the oil be heated and injected under the boiler with steam; therefore, all fires should be started with wood or coal, or by the use of small auxiliary boiler, and oil should not be introduced until five pounds of steam are secured.

For reduced oil: The tank should be 50 feet from plant, if above ground, and 25 feet if under ground, with the same arrangements as to the pipes and stop-cocks as are used with the crude oil.

The French Steel Rail Trade.

The following are the quantities of steel rails which the principal French railways received during 1890:—The Northern, 14,808 tons; the Eastern, 8,347 tons; the Western, 16,789 tons; Paris, Lyons and Mediterranean, 3,940 tons; the Orleans, 9,482 tons; and the Southern, 13 478 tons. This shows a total of 66,844 tons of steel rails which have had to be supplied to railways alone, which is an increase of nearly 10,000 tons on the figures of 1889. This total is however, with that of 1887, much below the average supply during the last ten years. We may, however, call attention to the fact, that now it is only repairs which lead to orders, while since 1881 it was the substitution of steel for iron rails which caused the high totals, which in 1883, amounted to 341,334 tons.

Cleaning Sheets of Wrought Iron, etc.

Wrought iron plates are pickled in hot dilute sulphuric acid in the ordinary way, commercial oil of vitriol diluted with 10 volumes of water being preferably used at a temperature of 200° F. The improvement consists in allowing the contents of the pickling tank, when sufficiently concentrated, to flow slowly through a long cooling channel and there deposit the greater part of the dissolved sulphate of iron, the mother-liquor passing into a vessel from which it is continually pumped back into the pickling tank, vitriol and water being added till it is of the proper strength. The process is continuous after being fairly started. Cylindrical pickling tanks are used for cleaning wire.—[E P. Peyton, Birmingham.

THE bath-tub manufacturers of the large cities of the United States, held a meeting recently, in Philadelpia, to form a combination for the betterment of prices for their products. Prices were agreed upon.

A NEW EXTERNAL FURNACE.

The disposition or consumption of waste in tanneries, saw mills, pulp mills, etc., has been an important problem with manufacturers in these kinds of business for some years. In earlier years water power was used in such mills almost entirely, and there was no satisfactory way of getting rid of the refuse. The tan bark was used for making roads and walks, and sawdust was thrown into the rivers on which the mills were located.

When it was found that the fish industry and other interests were seriously injured by this practice, legislation was sought, which would forbid the

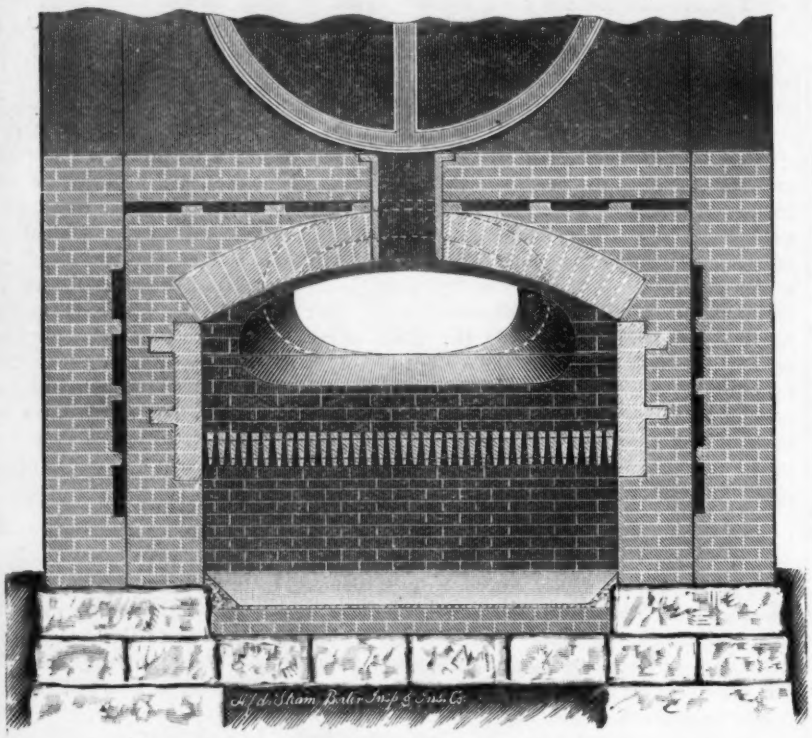


FIG. 1.—FRONT VIEW OF FURNACE.

waters being polluted in that way. Then large furnaces were constructed at a safe distance from the mills, where all such refuse as edgings and sawdust was consumed. These furnaces are still used in some sections of the country. But other manufacturers, who looked carefully into the question of economy, concluded that this waste could be utilized, and used as fuel under steam boilers, and as steam power became more generally used, the burning of the waste under the boilers was adopted.

Various methods for conveniently handling this fuel have been devised, and various kinds of furnaces have been proposed. The extension furnace has found favor in tanneries, saw mills and pulp mills, though different principles have been introduced in its construction The differences are largely in the design of what corresponds to the bridge wall in ordinary settings, at the rear end of the furnace. This sometimes has one large opening, and sometimes two or more smaller openings. In the usual forms with one opening, the escaping gases flow from the furnace directly through the opening, mingling but little with one another as they rise from the incandescent fuel, and passing directly to the fire surfaces or the boiler. Where two or more openings are used, the temperature has been found by experiment to be more or less unequal under the boiler, back of the bridge wall.

In order to overcome such difficulties as have been noticed, the furnace here illustrated was designed. Fig. 1 is a view from the front looking into the furnace. Fig. 2 is a longitudinal section through the furnace, and Fig. 3 is a top view, or plan of it. The opening in the rear wall of the furnace, it will be noticed, is contracted both horizontally and vertically, at about the middle, flaring towards the furnace and also toward the exit. This construction is seen clearly in the illustrations.

The general shape of the opening corresponds to what is known in physics and mechanics as the *vena contracta*. The gases escaping from the furnace flow without interruption into the flared opening, and if there are currents of different temperature, owing to the admission of an excess of cold air through the feeding doors of the furnace, or otherwise, they are brought together at the contraction, and are brought to as nearly uniform a temperature as possible. After emerging from the *vena contracta* (which in this construction is in the bridge wall itself), the gases are uniformly distributed to the heating surfaces of the boiler, and not concentrated on any particular point, as is the case with some other constructions.

In Figs. 2 and 3 it will be noticed that the grate bars do not extend entirely back to the bridge wall, but only as far as a flat ledge, or hearth, of firebrick, about a foot wide. In feeding the furnace it will not always be possible to cover the entire floor with fuel, and a space a few inches wide may some times be left bare at the back end. If the grates extended entirely back to the bridge wall, this would leave an open space at the back through which cold air would pour up from the ash-pit, chilling the gases from the burning fuel unnecessarily, and lowering the efficiency of the furnace. The hearth prevents this, and its action, we think, will be fully understoood without further explanation.

This furnace has been patented by Mr. J. M. Allen, of Hartford, Conn. He has assigned the patent to the Hartford Steam Boiler Inspection & Insurance Co. It will not be put on the market for sale, but will be used only in connection with the company's regular business, and for the benefit of its patrons. Mr. Allen has other valuable inventions which will be used in connection with tnese furnaces.—[The Locomotive.

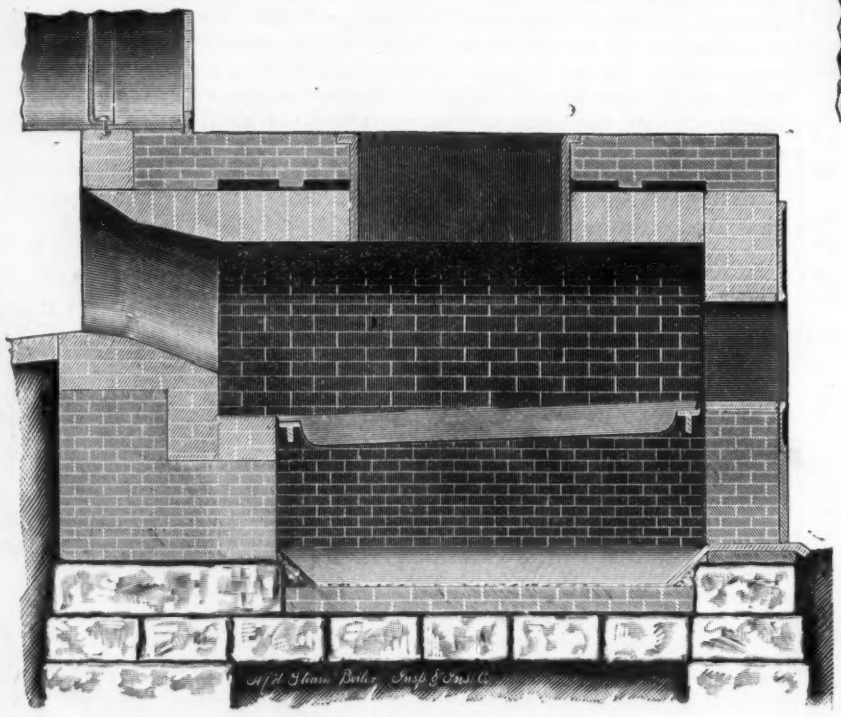


FIG. 2.—SIDE VIEW OF FURNACE.

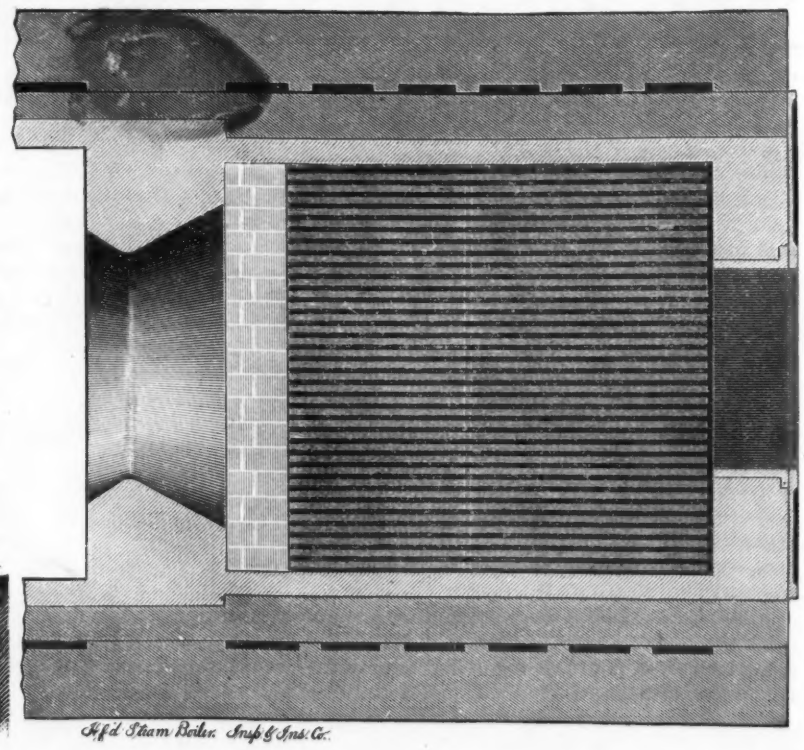


FIG. 3.—TOP VIEW OF FURNACE.

Trend of Population.

The Census Office has issued a bulletin giving the distribution of the population of the United States in 1890 and 1880 by drainage basin. An elaborate table accompanies the bulletin, of which the following is a condensation:

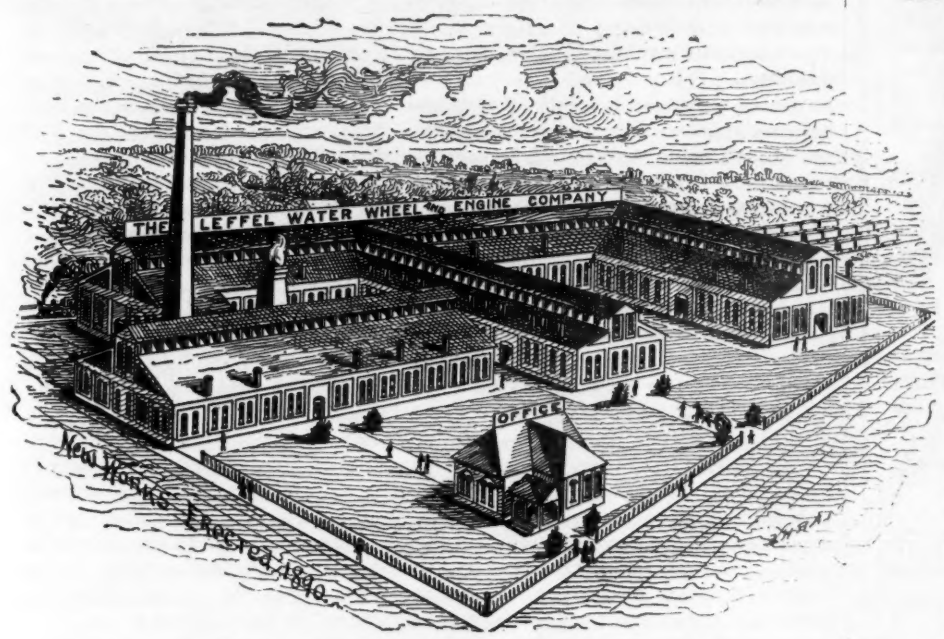
Divisions.	Per cent. total population. 1890.	1880.	1870.
Atlantic ocean	56.2	97.1	97.8
New England coast	7.2	7.6	8.5
Middle Atlantic coast	18.3	19.2	20.8
Southern Atlantic coast	6.8	7.4	7.3
Great lakes	11.2	19.7	11.0
Gulf of Mexico	52.7	52.2	50.2
Great basin	0.4	0.4	0.3
Pacific ocean	3.4	2.5	1.9

Of the percentages given in the above table for the drainage basin of the Gulf of Mexico, the tertiary division of the Mississippi river embraces 43.8 for 1890, 53 4 for 1880 and 42 4 for 1870. The table shows that more than 96 per cent. of the inhabitants live in the country that is drained to the Atlantic ocean; that more than one-half the population live in the region drained by the Gulf of Mexico, and that nearly 44 per cent. of the entire population of the country are congregated in the drainage area of the Missippi river; that only four-tenths of one per cent. live in the great basin, and three and four-tenths per cent. on the Pacific coast. It shows further that the proportion living within the region drained to the Atlantic is steadily diminishing, while of this region the part drained to the Gulf of Mexico is becoming relatively more populous, as is the case in a still more marked degree in the Great Basin, and the region drained to the Pacific.—[Bradstreet's.

THE Dupont Powder Co. will soon establish a new plant for the manufacture of gun-cotton and smokeless powder for use in the United States Navy.

LEFFEL WATER WHEEL AND ENGINE CO.

Another large manufacturing industry has, within the last year, started in Springfield, O., the Champion City, that will add much to the prestige already gained of being one of the greatest implement manufacturing cities in the world. It shows what push, energy, and brains can accomplish. The Leffel Water Wheel & Engine Co., although only a little over a year old, are now occupying their new plant situated on the Big Four Route in the eastern part of the city. The works are entirely new and very extensive, having been designed and arranged with the express purpose of facilitating the business of this large concern. The buildings are all of face brick, with walls 19 feet in height, and slate roof so arranged with ventilators that the distance from floor to top of ventilators is over 30 feet, thereby giving not only perfect ventilation and light, but adding much to the comfort of the employes. The works are divided into different departments. Each of which is under a competent head. The machine shop, boiler shop, foundry, and blacksmith shop have all



LEFFEL WATER WHEEL AND ENGINE CO.

been arranged so as to meet their special requirements, and are fitted throughout with all the modern improvements in the way of machinery of latest and best design. One especial inside feature of the works is the absence of posts or center supports in the building, and being fitted with traveling cranes, so arranged that heavy work can easily be lifted and taken to any part of the building. The company not only enjoys all the advantages of their new plant, but have brought to it an experience of twenty-five years in this special line of work, namely, the designing, building, improving and putting upon the market of the James Leffel double turbine water wheel, together with a splendid line of engines and boilers, all of which are thoroughly well made throughout of the best material, and the public may rest well-assured that they are what they are represented to be—really and indisputably first-class. The officers of this company are as follows: Warren C. Leffel, President; Fuller Trump, Vice President and General Manager; Percy Norton, Secretary and Treasurer, all of whom have grown up in the business and bring to it a large, practical experience, which, taken together with their thorough equipment in their new plant, enables them to produce their goods in the highest perfection. Any one about to improve water-power should not fail to write for their water wheel catalogue; and purchasers in need of steam power will do well to ask for their engine pamphlet and prices before buying.

INDUSTRIAL CITIES.

There is a general exodus of rural populations to the cities of the world. It may be more pronounced in one country than in another, but it is observable everywhere as one of the characteristic movements of modern times. The causes of the migration may vary in complexion and name, but the momentum is due to the material attraction of business, money, employment and the various conveniences and luxuries unattainable elsewhere.

History has its long line of such congested centers of brick and stone artisans and aristocrats, and its example of growth or decay are invariably in ratio with the industries included in the municipal circle. The prosperous cities of Great Britain are industrial. They outstrip the rest in population and importance. The loom, the forge and the pottery have made industrial centers of straggling hamlets, while the classic cities, dignified with ivy and culture, lag in the rear. Glasgow, with its shipyards on the Clyde, leaves Edinburgh grand and stagnant on the old hill; and Belfast, in Ireland, but a rudimentary hamlet at the battle of the Boyne, is now the industrial metropolis of the Emerald Isle. The secret of growth and transformation lies in the energy of industry and enterprise. It is the tap root of prosperity, locally and nationally. Spain was once queen of the seas and the lion of the Granadas; its ships were on every sea; its soldiers and colonists along the Andes and the swamps of Florida. It went in for glory and forgot business. Industry and enterprise ubsided as indolence, and pride crept up the Nevadas, and the historic consequence is seen to-day on the Iberian peninsula. Great Britain, at that time, was but a candle by the side of the Iberian star, but industry and enterprise have changed the situation, and the commerce of a little island, soused in the rude seas, is the greatest on the globe. In the future, as in the past, the same laws will be operative. We are not without historic examples this side of the Atlantic. Our manufacturing cities lead the way in wealth, population and influence, and a comparison can be made between New York and Chicago as industrial centers; and Boston, the metropolis of beans and brains. It will be on this line that the location of the great cities of this country will be determined. Hence the importance of encouraging manufacturing enterprise, and the folly of estimating labor as being only a means of buying shoes and paying rent. We have entered upon an industrial epoch in which enterprise will be dominant, and the destiny of men and nations will no 3be shaped by armies and navies, but by their industrial development.—[Age of Steel.

BUFFALO STATIONARY BLAST FORGE.

The accompanying illustration, shows an improved forge designed for use in shops provided with "fan" blast, and to meet the requirements of extra heavy work. The fire pit has a depth of 8 in., thus admitting of a strong deep fire necessary for handling of large and heavy work; when it is desired to run light work upon the forge, provision is made that the gates upon the sides can be opened, and the fire lowered 4 in. to suit.

The tuyere iron is of a design especially designed, intended to withstand heavy service without burning out, and is fitted with a 3½ in. windgate or valve for regulating the blast. The water and coal boxes are cast in one piece, with the fire-pan divided by a sloping partition for the easy removal of coal. It every respect, this forge is far superior to, cheaper and handsomer, than any brick forge which could be constructed. It is equipped with all the conveniences for handling work quickly, and is a very complete forge for a wide range of light and heavy work, such as is usually done in machine blacksmith shops.

The above forge, known as "No. 03" stationary, was originally gotten out for the extra heavy work required in railroad shops, and many points of its superiority are the result of suggestions from the master mechanic of the Union Pacific Railroad, a large number being used for heavy work in their different shops. The dimensions are 61x48 in.; height, 26 in, and weight 720 pounds.

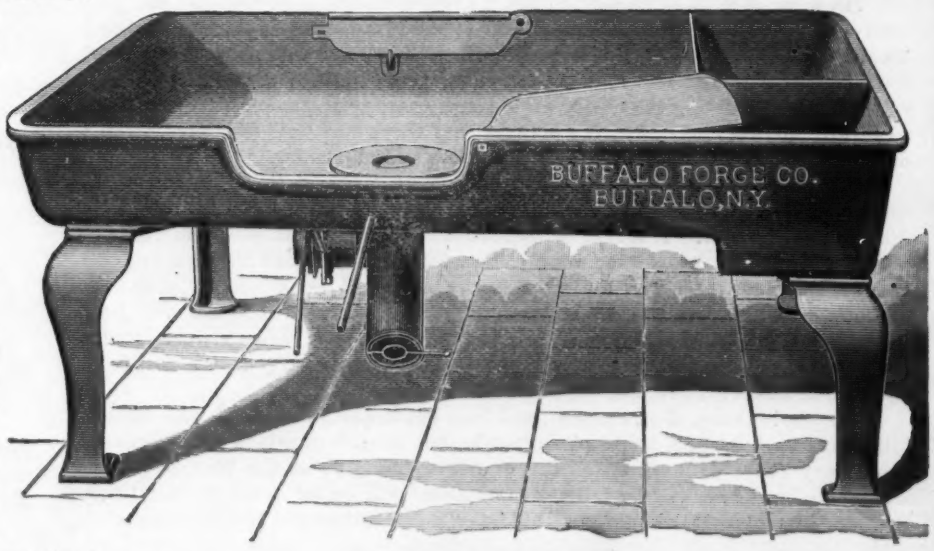
The Buffalo Forge Co, Buffalo, N. Y., are the manufacturers of this forge. They make a specialty of fans for heating, drying and ventilating purposes, and will furnish circulars and further particulars on application.

Putting out Fire with Sand.

In connection with the equipment, for fire protection, of wood-working establishments, it is recommended that a gallon pail, filled with fine sand, be always placed within convenient reach of each workman employed where oiling and finishing is being done. This practice might well be followed wherever there is a possibility of fire starting in oils or oil-soaked materials. There is nothing which will squelch an oil-fed fire in its incipiency more quickly and effectually than sand—and there are no afterclaps in the way of water damage, either.—[Fire and Water.

Seventeen Patents for Ball-Bearings.

Seventeen patents were issued recently to Mr. George F. Simonds, of Fitchburg, Mass., who, it is claimed, has solved the problem of applying ball-



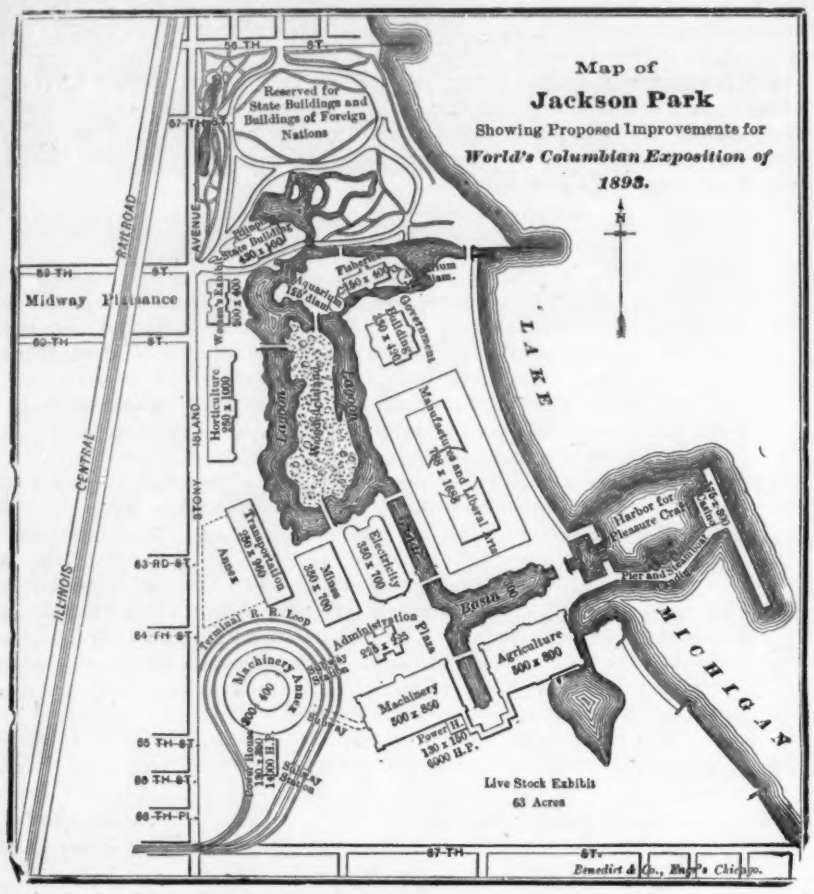
BUFFALO STATIONARY BLAST FORGE.

bearings to every shaft that turns, be it big or little, vertical or horizontal. Ball-bearings, as every one knows, are in universal use in bicycles. A perfect ball-bearing has long been a dream of inventors, since by its use friction may be reduced to a minimum, and power, heat, wear, oil, etc., be greatly economized. If Mr. Simonds' expectations shall be realized, the result will be a revolution in mechanics.—[Philadelphia Record.

A METALLURGICAL authority gives it as his opinion that the reason why steel will not weld as readily as wrought iron is that it is not partially composed of cinder, as seems to be the case with wrought iron, which assists in forming a fusible alloy with the scale of oxidation formed on the surface of the iron in the furnace.—[Glasgow Engineer.

THE COLUMBIAN EXPOSITION BUILDINGS.

Below we present a map of the Columbian Exposition grounds of Chicago, kindly furnished by the Bureau of Information:



So much has been written concerning the buildings that the map needs no further explanation.

THE PROPOSED WORLD'S FAIR MINE.

One of the many schemes proposed for the World's Fair, at Chicago, is the exhibition "mine" to be opened in the exposition grounds. The plan is to sink a large shaft to a depth of 500 feet, and at that level drive a system of drifts, radially, in which ore from all the important mining districts from the Rocky Mountain States is to be placed, as nearly as possible in the same manner in which found in the mines whence it came.

It was reported a fortnight ago that this scheme had been abandoned, but this was incorrect, as an attempt to secure the necessary capital is now being made in Utah and Colorado. Aside from the consideration of the undertaking as an investment, mining men are being urged to subscribe for the benefit which it will bring the mining industry in their various districts, by the exhibition of their ores.

The scheme is, in some particulars, a novel one, and, if carried out, will be likely to attract much attention, as did the artificial coal mine at the last French Exposition. Whether it is likely to pay or not is a question which we do not feel competent to decide. It will certainly be an extensive and expensive undertaking, involving the outlay of a large amount of money to open the underground workings in such a manner that there may be a free circulation of visitors, without the possibility of crowding and blockades.

Aside from the financial aspect of the scheme, however, it is hard to conceive how it can work any benefit to the mining industry in general, or any district in particular. It would be impossible to arrange the ore in any manner which would do more than simply show the ignorant that it comes out of the ground, and from the limited space that would be available, such an exhibit would necessarily be imperfect. The "mine" would have to be opened and fitted in such a manner, for the convenience of casual visitors, that it would be impossible even to illustrate what a mine really is like, or how operations, underground, are conducted.

The whole thing, if carried out, will be a burlesque on mining. An exhibition of ores, minerals, maps, photographs and models of mines, and mining machinery above ground, which there will certainly be at the World's Fair, and which, we hope, will be full and complete, will be far more instructive, than any artificial mine could possibly be.—[Engineering and Mining Journal.

Great Boom for Sault Ste. Marie.

Advices from England indicate that the colossal enterprise by which Sault Ste. Marie is to be made one of the biggest manufacturing centers on the continent, is likely to be a success. The company is organized for utilizing the enormous water power of Lake Superior, and constructing very extensive works in the vicinity of Sault Ste. Marie. The waters of Lake Superior fall at the Sault about 30 feet to the level of Lake Huron, the velocity being recorded by Gen. Powell, of the United States service, as a little more than 90,000 cubic feet a second. Careful and accurate measurements and calculations show the actual velocity and volume of water to be 122,000 cubic feet per second, equivalent to 236,000 horse-power. This company intend to build a tail race five miles long on the Canadian side, and a canal five miles long on the American side. These canals will be each 1,000 feet wide, the widest in the world. They will construct large dry docks on both sides, to be filled and emptied by gravitation. On the Canadian side all the principle works will be above the rapids, and on the American side below the rapids. Blast furnaces and shipyards, and it is expected paper mills, flour mills and other industries will be established, whose motive power will be supplied by this company, or by one of the several subsidy companies which it is expected will be formed.—[Canadian Manufacturer.

A NEW ENGLISH STEEL BALL ROLLING MACHINE.

The value of steel balls for frictionless bearings is well known, and recently they have been increasingly used in the bearings of all descriptions of cycles, but hitherto the great cost of producing them, owing to the time and material used in their manufacture, has placed them practically out of the field for ordinary purposes. The Steel-ball Manufacturing Co. (Limited), Manchester, have, however, now brought out a machine (Fairbairn's patent), by which they claim that steel balls can be manufactured at a considerably less cost than by any other present known process. Although simple in character, this machine involves an entirely new principle in construction and operation. It is provided with two horizontal discs, each having on one of its faces a spiral or involute groove, starting from near the rim of the disc and ending near its center, with a feeding rim round the edges, the shape of the groove being half-round, in cross section. These discs are placed one above the other, with their faces, on which the spiral grooves are formed, in contact, and in this position they are rotated in opposite directions. In the center of the lower disc there is a hole, in which the spiral groove ends. If a heated bar of steel is presented with its ends to the discs, so that it enters between them, the feeding-rims on the two discs grasp the rod and draw it forward until the outer ends of the spirals meet at the end of the bar at each revolution, and, acting like a pair of strong shears, cut off a short length of the bar. By the rotation the piece is rolled over and around in all possible directions, and is at the same time compressed in the grooves, which, being half round, ultimately give a perfectly globular shape to the separated portion of steel, and deliver it to a hole, through which the perfected ball drops from the machine. Of course, there are many adverse opinions regarding forged balls—namely, that they are liable to crack, and, further, that they will not wear like those cut from the solid steel—but the company claim that careful experiments have demonstrated that the balls manufactured by the Fairbairn machine are actually harder and less liable to crack than those made by the various methods at present adopted for producing them. This, however, is not altogether due to the process of manufacture, but has to some extent been attained after long and careful analysis of the steel employed, and a special method of heating the metal in the process of manufacture. The company claim, therefore, that by their system they are able to produce steel balls of the hardest description, perfectly solid, mathematically round, and true to size, at a much cheaper rate than by any other process. It may be added that the company are preparing to manufacture balls from any size from ⅛ inch to 2 inches in diameter, or even larger if required.—[London Ironmonger.

Testing Frozen Steel.

The French government has caused to be made several tests of gun steel at a low temperature, 75° to 100° below Fahr. Part of the bars were hardened and part unhardened. The breaking load was increased by the cooling 3 per cent. in the instance of the unhardened bars, and 6 per cent. in that of those hardened. But in a shock, such as a gun would be subjected to, the unhardened bars, cooled, broke on an average with 5 9 blows, against 14.6 blows under ordinary conditions. With the hardened bars the difference was less, 12 57 blows being required for the cold bars, against 14 4 at the nominal temperature. The bars, both hardened and unhardened, had their elastic limit raised 11 per cent. by the cold, and their elongation was diminished by 12 to 14 per cent. The bars recovered their original properties upon attaining the ordinary temperature.

Death of an Old Furnaceman.

John Maycock, father of Mrs. Phillip Mansell, of this city, died last Thursday, at the home of a daughter in St. Clairsville, O., aged about 80 years. Years ago he was sent to India, by the British government, to build and run blast furnaces there. After ten years spent in this occupation he left there on account of the Sepoy rebellion which almost stopped trade and manufactures. He built a number of furnaces in this vicinity, and superintended the old Ward furnace, of Niles, at the time of the panic in 1873.—[Youngstown (O.) Telegram.

THE pioneer in the manufacture of wire nails in America was the American Wire Nail Co., incorporated at Covington, Ky., in 1873. Its first plant was a small one, and for many years its growth, while gradual, was slow. The real development of the wire-nail business has practically occurred since 1886, and in this latter development the American Wire Nail Co. has played an important part. About two years ago it removed to Anderson, Ind., in order to secure better facilities for manufacturing, chief among which is a supply of cheap fuel. On its removal to Anderson the plant was greatly enlarged, and now comprises a rod rolling-mill, a wire-drawing works, and a wire-nail factory.

Excursion via Valley Railway to Steubenville, O., April 27 and 28, 1891—State Encampment G. A. R. of Ohio.

The Valley Railway will sell excursion tickets on the above date, good returning until May 1st., inclusive, at the following low rates: Cleveland, $2 30; Akron, $2 10; E. Akron, $2 10; Canton, $1 55. For further information apply to agents or address J. B. Caden, G. A. R., or J. T. Johnson, Gen'l Supt., Cleveland, O.

A NORTHERN IRONMASTER ON SOUTHERN COMPETITION.

Very much has been written and said of the strength of the iron industry of the Southern States and the remarkable advantages that are offered by the coal and iron resources of that section, but those who have sought to discredit the advantages enjoyed by Southern iron manufacturers have confined themselves rather more to general denial of the claims of the South than to attempt to disprove these claims. There are a few conspicuous figures of disadvantages under which the Southern iron industry is laboring that reveal the weakness of this important branch of Southern development, and at this time, when the iron trade of the entire country is suffering from serious depression, these points are of more than ordinary interest. It is not the intention of the writer to treat these matters exhaustively, but merely to venture a few conclusions that have been drawn from a considerable study of the subject.

Interest charges figure in the Southern iron industry with a prominence that is not observable in any other section of the country, and this element is to-day probably the greatest burden that rests upon the iron makers of Alabama, Tennessee and Virginia. These interest charges may be divided into two classes, interest upon bonded capital and interest upon borrowed money. In the first instance the fault is over-capitalization, and in the second case the iron trouble is due to insufficient working capital. There are several large iron making companies in the South that have sunk all their share capital in their plant and have been forced to resort to the issuance of bonds to provide apital for the operation of their works. In the few instances of this character that are presented in the South the item of interest in the cost of a ton of pig iron reaches an amount that would be considered a good margin of profit by a Pennsylvania or Ohio iron manufacturer. The Tennessee Coal, Iron & Railroad Co. presents a representative case of this character. In addition to its share capital of $10,000,000, this company has outstanding about $6,000,000 in bonds bearing interest at 6 and 7 per cent. The interest and sinking fund charges upon these bonds amount in round figures to over $400,000 per year, or more than $1.50 for every ton of pig iron produced. There are few blast furnace properties in this country that have realized as much as $1.50 profit per ton of product during the last year, notwithstanding the great activity and high prices of the first month of that year.

The Sloss Iron & Steel Co., of Birmingham, Ala, one of the largest producers of pig iron in the South, furnishes another similar illustration. This company has a capital stock of $3,700,000 in stock, and there are 6 per cent. bonds outstanding to the amount of $4,000,000, of which $2,000,000 was sold three years ago at 37½ cents on the dollar to secure working capital. To pay the interest upon the bonds of this company the mines, coke ovens and furnaces must earn $240,000 above their operating expenses. The furnaces of this company are rated as having an annual capacity of about 123,500 gross tons of pig iron. The latest published statement of this company that has been seen by the writer covers the year ending February 1st, 1890, during which period 108,735 tons of iron were made. Upon this basis the interest upon the bonds of this concern would amount to about $2.20 per ton of pig iron. It is not the intention of the writer to direct attention to these two companies as examples of mismanagement or defective constitution. They are cited simply because they illustrate very forcibly a serious weakness in the Southern iron industry, and because their published statements give figures not ascertainable as regards other companies. The concerns in the North and West against which such as these are brought in direct competition are able to pay much higher prices for ore and fuel and their transportation and still both hold their trade and make good profits, simply because their plants are paid for, their capital is no greater than economical and careful management requires, and their interest account is reduced to a minimum.

Another class of iron manufacturers in the South is more numerous than that to which attention has been called, and includes those establishments that are operated on temporary loans, which are renewed from time to time, as occasion demands. There are now a few blast furnaces in the South that were built as adjuncts to land-booming schemes, their projectors having a childlike ignorance of all the intricate details of iron making, as well as a sublime disregard of all the conditions that are requisite to an advantageous location. With these furnaces may also be classed those plants in which the owners invested all their means, and had nothing left for working capital. There have been several conspicuous examples of this latter class; men whose zeal was greater than their experience, and who had no conception of the working capital that is required to keep a blast furnace in operation. The burden that these two classes of manufacturers carry consists of high interest rates on their borrowed money, and an inability to adjust themselves to the changing conditions of the market.

Not only does the item of interest add largely to the cost of the pig iron made, but the outstanding notes makes it imperative that the product of the furnace shall be converted into cash with the least possible delay. If prices are low and business dull, concessions must be made to purchasers to keep things moving. If the prices obtainable do not afford any margin of profit to the furnace, there are but two courses open for the manufacturer who is doing business on borrowed money. He must either sacrifice profit, and take what he can get, or, if he anticipates better prices, he can put his iron in a warrant yard, receive advances upon it, and pay storage and interest charges, which results in a complication of financial obligations from which a safe escape is difficult and often impossible.

It may be argued that these financial conditions are not peculiar to the South, but are to be found to a greater or less extent throughout the country. From personal observations the writer is led to believe that this argument cannot be sustained. Briefly the situation is this: The iron industry of the South has been built up with phenomenal rapidity. Modern furnaces and rolling mills have been built at enormous cost; not gradually, as the development of trade demanded, but all at once, starting from nothing and ending with a complete and extensive plant. The amount of capital thus called for has been enormous, and constitutes a heavy burden upon the manufacturer. In Pennsylvania, Ohio and other iron making States in the North, most of the plants now in operation have been gradually developed from small beginnings of years ago. Furnaces and mills that were built 10 or 15 years ago have been improved and extended each year out of the profits of the preceding years, and the cost of the plants as they now stand has been distributed over a long period of years. The cost of construction has thus practically been wiped out and the capital account reduced to a minimum. With no bonded capital, with small interest charges, and with working capital sufficient to meet any ordinary demands, the Northern iron manufacturers are able to keep their business closely in hand and accommodate themselves to changing conditions of trade. Illustrative of this is the present shut-down of the blast furnaces in the Shenango Valley of Western Pennsylvania and the Mahoning Valley of Eastern Ohio, where some 35 stacks have been idle for over two months awaiting an improvement in the iron trade. The owners of these furnaces suffer no inconvenience from the idleness of their plants beyond a loss of profits, and their capital is not being eaten up by interest charges while their fires are out. Such a course as this could not be pursued in the South by more than half-a-dozen concerns in the business. Indeed, the past two months have presented several instances of Southern iron concerns that have collapsed under the burden of borrowed money, the depressed condition of trade rendering it impossible to meet interest charges and take up outstanding notes.

None of these points that have been suggested have any bearing upon the resources of the South and the possibility of making iron there at small cost and satisfactory profit. When the business methods that have given such stolidity and strength to the Northern iron industry are followed in the South, the results are all that could be desired. There are several former Northern iron manufacturers who are now engaged in the same business in the South, and they are making good iron cheaply and at a profit. The weakness of the Southern iron industry, which is so apparent at present, is due, not to lack of mineral resources, but to inexperience, speculation and faulty business methods. Such a combination will work speedy failures anywhere and in any line of business.—[Philadelphia Manufacturer.

The Barb-wire Situation.

The secretary of the new barb-wire corporation furnishes *Hardware* with this official statement: "The Columbia Patent Co. was incorporated under the laws of Kentucky for the purpose of buying and selling patents, licensing and collecting of royalties. It has bought the barbed wire and barbing machine patents formerly owned by the Washburn & Moen Manufacturing Co., and I. L. Ellwood, and succeeds to their business in licensing and collection of royalties on barbed wire. All the prominent manufacturers, including the former licensees, and all those who have been contesting the patents, have become stockholders in the new company and will take out licenses. The old licenses will be taken up and a new one issued, which will permit the manufacture of the Glidden pattern by any manufacturer. The offices of the company will be at Nos. 905, 907 and 909 Rookery Building, Chicago. The officers are: President, O. M. Gregg, Crawfordsville, Ind.; Vice-President, J. R. Ashley, Jolliet, Ill.; Secretary, W. C. Shurtleff, Chicago, Ill.; Treasurer, Alfred Clifford, St. Louis, Mo. Directors, George T. Oliver, Pittsburgh; J. W. Gates, St. Louis; W. M. Dillon, Sterling, Ill.; H. Belmer, Cincinnati; John Lambert, G. M. Fish, Joliet; and O. M. Gregg, Crawfordsville, Ind."

The firms composing the Columbia Patent Co. are the St. Louis Wire Nail Co., St. Louis, Mo.; Braddock Wire Co., Pittsburgh, Pa.; Continental Wire Co., St. Louis, Mo.; Janesville (Wis) Barbed Wire Co.; Omaha Wire, Fence & Nail Co.; Consolidated Barbed Wire Co., Lawrence, Kan.; Superior Barbed Wire Co., De Kalb, Ill.; Baker Wire Co., Chicago, Ill.; California Wire Works, San Francisco, Cal.; Iowa Barbed Wire Co., New York City; Oliver & Roberts Co., Pittsburgh, Pa.; Indiana Barbed Wire Co., Crawfordsville, Ind.; Cincinnati Barbed Fence Co.; Cleveland Rolling Mills; Northwestern Barbed Wire Co., Sterling, Ill.; Lambert & Bishop Wire Co., Joliet, Ill.; Enterprise Co., A. H. Schreffler, Joliet, Ill.

Previous World's Fairs

The following table shows some interesting facts concerning previous World's Fairs. It will be seen that while a gradual increase in magnitude has been the rule, the recent Paris Exposition far outstripped all of its predecessors in the number of admissions and receipts. Its receipts were more than two and a quarter millions of dollars over its cost:

Where Held.	Year.	Acres Covered by B'ld's.	No. of Exhibitors.	Days Open.	No. of Admissions.	Receipts.
London	1851	21	17,000	144	6,039,135	$1,780,000
Paris	1855	24½	22,000	200	5,162,330	644,100
London	1862	23½	28,653	121	6,211,103	1,644,260
Paris	1867	37	52,000	217	10,200,000	2,103,675
Vienna	1873	40	42,000	186	7,254,687	.....
Philadelphia	1876	60	30,864	159	9,910,996	3,813,724
Paris	1878	60	40,356	194	16,032,725	2,531,650
Paris	1889	75½	55,000	183	28,149,353	8,300,000

The World's Columbian Exposition will certainly be greater in some respects than was the last at Paris. The buildings will cover at least 50 per cent. greater space; its cost will be more than twice as much, and the number of exhibitors is sure to be very much greater. How the attendance and receipts will compare with those of the Paris Fair remains, of course, to be seen.

New Pullman Vestibule Sleeping Cars on the Mt. Vernon & Pan Handle Route.

New Pullman vestibule sleeping cars of latest improved pattern have recently been added to the equipment of the Mt. Vernon & Pan Handle route, and run on train leaving Cleveland daily at 3 P. M., arriving at Cincinnati at 7:10 A. M.

PROTECTING YOUR BUILDINGS With an automatic fire sprinkler system makes it absolutely fire proof. All Insurance Companies recognize the "Neracher" as the best made and will make liberal reductions on your present rates if you equip. In this way the system pays for itself inside of two years' time.

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Boston, Chicago, St. Louis, Cleveland, Cincinnati, Minneapolis, Pittsburgh.

THE TINPLATE SITUATION ABROAD.

The present condition of the tinplate trade is curious, and characterized by many features which are anomalous. The level of prices is somewhat high, owing to the recent large demand for the United States, and makers are disposed to hold out for full figures, under the impression that there will be at least one more "rush" from America, prior to the coming into operation in July next of the duties imposed by the McKinley tariff. Whether this anticipation is, or is not, well founded will shortly be seen, but it must be confessed that it seems improbable at the moment. Very heavy stocks have been accumulated here or in the States by buyers, and the course of values on the other side appears to indicate that a drop is on the cards, the idea being that the American market cannot carry any larger quantity of tinplates than that which is already on hand. If that view is correct—and we should not be surprised to find it is—it follows that our tinplate manufacturers have now seen the best of their great market, and must be prepared to fight for the American trade on conditions which will be more onerous than at any former time. Exactly what may be the competition of the American tinplate makers can not be foretold with accuracy, but there is a good deal of "blow" on the subject on the other side of the Atlantic, and if we are to believe some of the American newspapers, really marvelous progress is being made with the new industry. Many mills are said to be in progress, and there is constant jubilation among the protectionists anent the driving out of the market of British tinplates. A very liberal discount may be safely taken off these statements, and it may be taken for granted that for some time after July next we shall send many tinplates across the Atlantic, yet in view of what is happening, and may happen there, it would be prudent for our tinplate makers to use diligence in cultivating new markets. A report has been circulated to the effect that they are doing so in an organized manner, by sending representatives to India, Ceylon and China in order to teach the natives how to pack tea in tinplate boxes. This report is of the *ben trovato* order. It is good enough to be true, and sufficiently likely to be so on the face of it, but our inquiries have failed to elicit that it is accurate. We have inquired in all likely quarters, but have not been able to obtain any corroboration of the statement. We hope, nevertheless, that it is founded on fact, and that steps will be taken to induce the tea planters to use tinplates instead of the clumsy old wooden chest, with its not very wholesome lead lining. Experiments have proven that tea can be packed and will, in all respects, keep well in tinplate boxes. Such boxes have been tried in Ceylon with marked success, and there is no reason whatever why they should not be used universally for the purpose in Ceylon and India. That method of packing would serve to distinguish the superior teas of our great Eastern dependency, and would have the great advantage of thereby breaking down the innate conservatism of the Chinese in the most effective manner. Apart from the tea trade, however, many new uses could be found for tinplates if the manufacturers will give their minds to the subject. The canning of fruit is becoming an industry in South Africa and Australia, and the preserved meat business is extending in many parts of the world. The loss of the American market—if it occurs—may prove to be the gain of the tinplate makers if they have the resolution to grasp their nettle, throw off the chains of their financiers, and exploit the world on their own account.—[London Ironmonger.

STATUS OF THE STEEL RAIL MARKET.

Since last week the apathy of buyers has given way, and a number of railroads which have been holding off for some time past have been forced to enter the market in order to procure the material for Spring repairs. There have been a good many contradictory rumors concerning the purchase of the Pennsylvania Railroad Co. We have it on good authority that its purchase amounts to 31,000 tons, distributed among the mills along the line of its road. The company had previously ordered at different times for repair work an aggregate of about 9,000 tons. Further orders must be placed later on. The Erie Co. have bought 4,000 tons for immediate delivery, and have an option for 6,000 tons more, which will be placed as soon as reports of division superintendents are in. The New York Central have bought for the Rome, Watertown & Ogdensburgh 9,000 tons, which, with a purchase of 12,000 tons made last Winter, leaves only a part of their requirements covered. The New York, Providence & Boston line have taken 1,500 tons, 1,000 tons have been purchased for immediate delivery for export to Mexico, and some minor sales and additions to former purchases foot up to about 2,000 tons. It is reported, too, that the Lehigh Valley, which had already placed close upon 18,000 tons, had increased its order to 25,000 tons, and that the Mohawk & Northern, which it is insisted is not a connection of the New York Central, had added 5,000 tons to its previous purchase. There has, therefore, been a good deal of activity, the most striking feature being that the majority of orders are for early shipments, thus showing that the railroads have been holding off to the last moment. The placing of the Pennsylvania order is generally the signal for buying on the part of many other lines, and this movement may, therefore, be looked forward to now. We underestimated the quantity of rails thus far purchased in a recent issue. The official report shows that up to March 1st the mills had booked for 1891 delivery 418,477 tons of standard rails, of which Western mills took about 225,000 tons. Since then, including the sales just reported, there must have been placed so many additional orders as to bring the total up to 550,000 tons. The deliveries, however, have been exceedingly light thus far, having been probably less than 175,000 tons up to April 1, of which only about 65,000 tons are to be credited to Western mills. In other words, while under ordinary circumstances the mills run fairly well during the first quarter, the policy this year has been to hold back, notably in the West. Now the mills are rapidly getting into shape for steadier work, a fact which cannot help telling on the situation in raw materials. At least one of the Eastern mills has withdrawn the usual tidewater quotation of $30.75 and quotes $30 at mill, net. It is probable that this example may be followed by others in the near future. We quote $30.75 @ $31.25 at tidewater.—[Iron Age.

Iron and Steel Works in China.

According to the *North China Herald* the construction of the new iron and steel works in China is going on slowly. It has not been an easy matter to find in the environs of the provincial capital a suitable place for their erection. After much delay and talk a site has been chosen on the Northern slope of the Hanyang hills, between the ridge and the Han river, opposite to the city of Hankow, and thus close to the Yangtze, with which afterwards the works will be connected.

As far as ascertained, the factories will be very important, and will comprise for the present two large blast furnaces of the Cleveland type, with all their apparatus, appurtenances and machinery, capable of producing about 100 tons of pig iron daily. There will be also a complete Bessemer plant, including two 5-ton converters, with cupolas, casting cranes, large blowing engines, etc. The ingot steel made there will be rolled out into flange rails, so that the specifications include necessarily a large rail mill and all machinery and apparatus for the same. The manufacture of rails for their future railways has been the chief object of the Chinese in designing these iron and steel works. A small Siemens-Martin plant will complete the steel works. Its object is the casting of soft steel for ship plates and special metal for the Viceroy's small arms and gun factory. As for the iron department it will also be a very complete one, including some 20 puddling furnaces and a plate and bar mill with all the indispensable machinery.—[Iron and Steel Trades Journal, London.

G. A. R. Excursion to Steubenville G. A. R. Encampment, April 28, 29 and 30, 1891.

On the occasion of the G. A. R. Encampment, at Steubenville, O., the Wheeling & Lake Erie Railway will run special G. A. R. headquarters train, starting from Toledo with Department Commander Dowling and staff, at 11:30 A. M., Monday, April 27th, and reaching Steubenville in time for supper the same day. Excursion tickets for this and all regular trains will be sold April 27th and 28th to the public at the rate of one cent per mile, with limit of tickets for return passage good up to and including May 1st, 1891. Time of special and regular trains at all stations will be shown on bills of particulars, which can be obtained from any agent of the Wheeling & Lake Erie Railway. James M. Hall, G. P. A., Toledo, O.

Pennsylvania Lines.

Excursion tickets to Steubenville, account G. A. R. State, Encampment will be sold via the Pennsylvania Lines April 27th, and 28th, at $2.30 for round trip from Cleveland. Tickets will be good returning until May 1st.

INDUSTRIAL SUMMARY.

New Enterprises:—

Large iron and steel works may be established at West Newton, Pa., by J. W. Baily.

The Bates Steel & Iron Co., capitalized at $100,000, have been incorporated at Columbus, O.

It is stated that a rolling mill is to be erected in Baltimore, Md., by C. D. Beckwith, of Patterson, N. J.

The O. L. Packard Machine Co., of Milwaukee, Wis., has filed articles of incorporation signed by W. S. Williams, Fred H. Kappe, Fred Hildebrand and James Morrison.

The Watseka Automatic Hinge & Manufacturing Co., of Watseka, Ill, with a capital stock of $33,000, by Emil H. Laughaus, S. L. Stiles, W. H Harry and Joseph W. Fiddler.

J. W. Bryan, J. O'Hara and S. D Rouse have incorporated the Turner-Beard Brake Co., at Covington, to manufacture brakes for locomotives, cars, wagons, etc. The capital stock is $10,000,000.

The Morrell Metallic Railway Tie Co., of Jersey City, N. J, has filed articles of incorporation. The amount of capital stock is placed at $250,000. The company will deal in patents for railroad ties, etc.

The Gardner Steam Pump Co. has been incorporated at Quincy, Ill., with a capital stock of $50,000, to manufacture steam pumps. The incorporators are Robert W. Gardner, L. C. Neustat and J. W. Gardner.

The National Malleable Iron Co., of Peoria, Ill., has been incorporated to manufacture malleable iron and machinery. The capital stock is $100,000, and the incorporators are A. Henry, A. C. Angler and George A. Wilson.

The Audobon Iron Works, Limited, is the name of a new and extensive manufacturing enterprise projected at New Orleans. The capital stock will not be less than $1,000,000, and the manufacture of sugar machinery will be made a specialty.

The Toledo Bridge Co., of Toledo, O, has been incorporated with a capital stock of $100,000 to manufacture and construct bridges and structural iron and steel works. The incorporators are James A. Huston, E. F. Smith, G. P. Waddorf, L. E. Clark and E. W. Toleston.

The Western Steam & Street Railway Equipment Co., of Chicago, has been incorporated with a capital stock of $100,000. The company proposes to deal in equipments for steam and street railways. John S. Methot, Luther M. Tracy and Charles T. Farson are the incorporators.

The Steele Signal Co. of Chicago, has been incorporated to manufacture and deal in all kinds of railway appliances and devices and all other kinds of railway devices and appliances, capital stock, $1,000,000. The incorporators are Charles Higgins, Harry W. Powers and Robert E. Davidson.

The Cold Rolled Steel Co. has been organized in Pittsburgh, Pa., by W. H. Nimick, H. A. Jack, James W. Tyson, Jr., W. J. Howard, Jr., and Samuel B. Shoemaker. The capital stock has been fixed at $50,000 with privilege to increase. It is the intention to make all shapes of cold rolled steel, including sheets, plates, round, half-round, half-oval, etc.

Additions, Enlargements, Removals, etc.:—

The Harrisburg Boiler & Manufacturing Works, at East Harrisburg, Pa., will increase capacity.

The Eliot Frog & Switch Co., of East St. Louis, Mo., is about to enlarge its shops by an addition of 40x140 feet.

The Scott Machine & Hardware Co., at Denver, Col., are enlarging premises to double former size, and will put in several new tools.

Large car shops for the New Jersey Central Railroad will be built on the meadows, near Elizabethport, giving work to 1,000 mechanics.

The new foundry of Dougherty Bros., at Lowell, Mass., will, it is said, be furnished with machinery to run by electricity, at a cost of $35,000.

Joseph B Reed, Cairo, Ill., manufacturer of wood-working machinery, for railroad and general machine shop use, has recently erected an addition to his plant, consisting of a three-story brick shop 50x125 feet.

J. D. Kase, of Danville, Pa., has been elected manager of the North Carolina Steel & Iron Co., at Greensboro, N. C. Mr. Kase has received instructions to construct the 100-ton furnace which has been talked of for some time.

The Laughlin Manufacturing Co., of Louisville, Ky., have closed a contract with the Harvey Land Association, of Harvey, Ill., a suburb of Chicago, for 485x200 feet of property, fronting south on 151st street, to be utilized as a factory site. The Laughlin Manufacturing Co., of which S. E. Bliss is Manager, will employ about 150 men at their works, in the manufacture of shafting and pulleys.

The Ellis & Lessig Steel & Iron Co., Limited, of Pottstown, Pa., announce that they have favorably considered an offer of $100,000 and 40 acres of land, made by the citizens of Salem, Va., if they would remove their plant there. The concern employ 700 men in their nail factory, plate and puddle mills, and as soon as the present stock is worked up they will remove their machinery to Salem. The necessary papers were signed last month.

Fires and Accidents:—

The Hartford Engine & Machine Co., of Hartford, Conn., were burned out on the 8th inst.

The machine shops and foundry of Remillard & Co., at Three Rivers, Quebec, have been destroyed by fire; loss, $8,000.

The Texarkana (Ark.) Machinery & Foundry Co.'s building, machinery, etc., was destroyed by fire on the 11th inst. Loss, $30,000; insurance, $12,000. The work of rebuilding will be commenced at once.

On the 13th, the malleable iron works conducted by Geo. Rollings & Co., at 33rd street, Pittsburgh, Pa., were destroyed by fire. The gross loss was was stated by Mr. Rollings to be $40,000, on which there is an insurance of $13,000. The plant will be rebuilt at once. Quite a large quantity of stock and machinery were destroyed with a number of valuable patterns.

General Industrial Notes:—

The Toledo Machine & Tool Co., of Toledo, O., have purchased the elevator business of Smith & Haldeman, of that city, and will carry on business in the above lines at the establishment just acquired.

One of the largest castings ever made in Worcester, Mass., was poured at the Star Foundry recently. It was a fly wheel, weighing over 20 tons, and was 20 feet in diameter, with a 42-inch face. It will be finished in Fitchburg, there being no lathe large enough in Worcester.

Arrangements have been perfected at the Douglass branch of the American Axe & Tool Co to use crude oil instead of coal and coke in the forging department. A large tank, holding 7,000 gallons, has been put in at the station on the New York & New England Railroad and another one at the axe works.

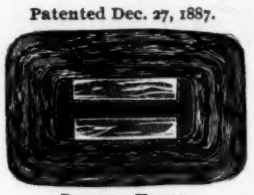
The Cleveland Rolling Mill Co's. blooming mills shut down the 14th, owing to the scarcity of coke resulting from the Pennsylvania strike among coke makers. About 200 men were deprived of their employment. It is expected that other portions of the mills will be closed as there is very little coke in this city. A coke famine is imminent.

The New Castle Wire Nail Works is one of the giant industries of the United States. Its record so far has not been surpassed by any similar establishment in the world. During the months of February and March nearly 2,000 tons of nails were shipped over the Pennsylvania lines alone, without reference to the amount shipped by other lines. These 2,000 tons of nails would make a solid train of 100 cars of 24 tons each, which would be over a mile long. The works are being run to their full capacity and prospects are good for steady work all Summer.—[New Castle (Pa.) Guardian.

The rapidly increasing business of the Chicago branch house of the B. F. Sturtevant Co., of Boston, Mass, has necessitated its removal to new and much larger quarters at 16 South Canal St., Chicago, Ill., where an entire new building furnishes ample accommodations for the large stock of blowers, exhausters, heating and ventilating apparatus, portable forges and steam engines. This branch will remain under the energetic control of Foss & Noble and will form the headquarters for the trade of the Middle and Western States. The stock will be greatly increased in order to provide for immediate shipment in all cases, and a corps of experienced engineers will be maintained for estimating upon and installing plants for heating, drying, ventilation, etc.

It is not a Dead, but a Live Elastic Packing.

Patented Dec. 27, 1887.



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That will pack a Steam, Water, Oil, Air or Ammonia Rod, also a Smooth, Fluted, Out-of-Round or Vibrating Rod, an Engine, Pump, Ice Machine, Air Compressor, Steam Hammer, Rotary Rod, or any rod that has to be packed, and keep it tight without pressure or friction, as it works automatically.

We will prove this by yourself. If you will send for enough to pack a rod, we will send it on 30 days' trial, and prove to you that the "Sensible" Automatic Packing is the "Best" made, therefore is "Cheapest."

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Shafting and Hangers always in stock.

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PERFORATED METALS OF EVERY DESCRIPTION BY THE HARRINGTON & KING PERFORATING CO. CHICAGO.
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PERFORATED METALS OF ALL KINDS

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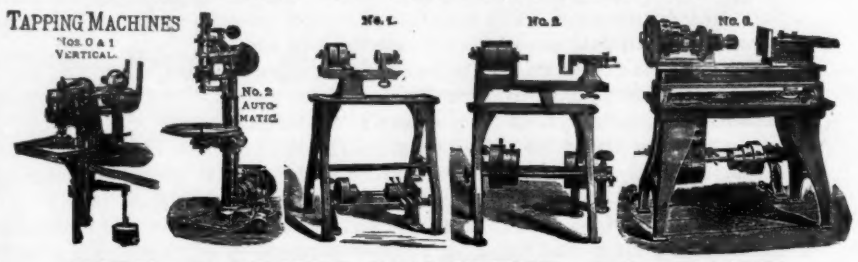

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Manufacturers of, and Dealers in, all kinds of
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Universal and Plain Milling Machines, Drill Presses, Screw Machines, Hand and Engine Lathes, Planers, Profilers, Chucking Machines,
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Plants for Manufacturers of Sewing Machines & Electrical Goods.
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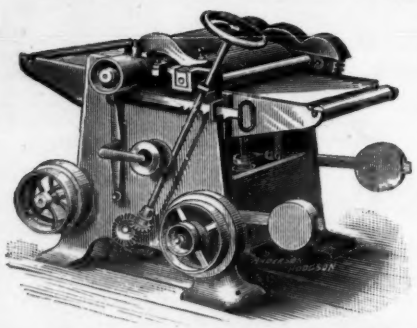
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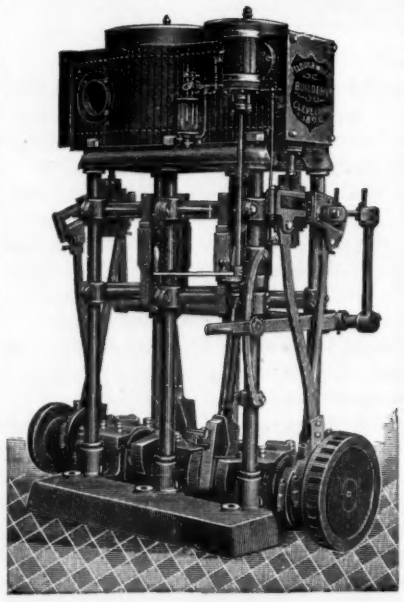
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Builders of Machinery for Hardware Manufacture.
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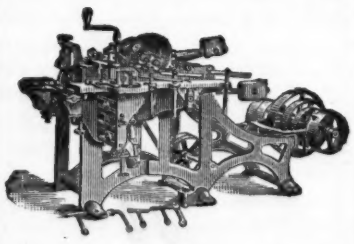
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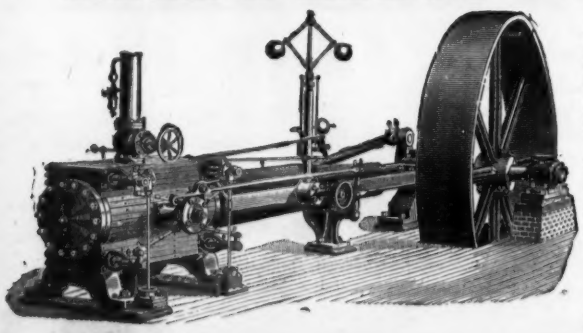
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Harlow Lubricator.
Brand new. Cheap. Address,
LUBRICATOR,
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Plate Iron Washers
A SPECIALTY!
Even in Guage, smooth and well finished.
Cut from new plate, rolled expressly for the purpose. Write for prices, Address,
MILTON MFG. CO., Milton, Pa.

The Wock Patent Slip Joint Eaves Trough, 10 ft. 2 in. Long, Without a Seam.

Steel and Wire Hangers, Etc.

THE BELDING PATENT LOCK SLIP JOINT TROUGH, Manufactured by **THE CANTON STEEL ROOFING CO., Canton, O.**

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, net cash) Bessemer, $17 30; No. 1 Foundry, $16 80; No. 2 Foundry, $15 80; No. 1 Gray Forge, red short, $14 80; No. 2 Gray Forge, neutral, $14 30; No. 1 American Scotch, $16 80; No. 2 American Scotch, $15 80.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1 foundry, $16 25@17 00; Southern Coke No. 2 Foundry, $15 75@16 50; Southern Coke No. 3 Foundry, $15 25@16 00; Southern Coke No 1, Softeners, $15 75@16 50; Southern Coke No. 2, Softeners, $14 75@15 50; Ohio Silveries No. 1, $18 00@18 75; Ohio Silveries No. 2, $17 00@ 17 75; Ohio Strong Softeners No. 1, $18 25@19 50; Ohio Strong Softeners No. 2, $17 50@18 75; Lake Superior Charcoal Nos. 1 to 6, $18 00@19 00; Tennessee Charcoal No. 1, $18 00@19 00; Tennessee Charcoal No. 2, $17 50@18 50; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 00@15 25; Hanging Rock Coke, No. 1 foundry, $16 50@17 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $16 50@17 50; Hanging Rock Charcoal, No. 1 foundry, $20 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $13 25@13 75; Standard Southern Coke, mottled, $13 00@13 25; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $20 00@20 50; Tennessee Car Wheel, $18 50@19 50; Lake Superior Car Wheel, $19 50@20 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $17 50@00 00; Mahoning and Shenango Valley strong, No. 2 Foundry, $16 25@00 00; Ohio Softener No. 1, $17 25@00 00; Ohio Softener No. 2, $16 25@00 00; Jackson Co., Silvery No. 1, $18 00@00 00; Jackson Co. Silvery, No. 2, $17 00@00 00; Lake Superior Charcoal, $18 50@00 00; Tennessee Charcoal, $18 50@00 00; Southern Softener No. 1, $16 50@00 00; Southern Softener No. 2, $15 75@00 00; Southern Strong No. 1 Foundry, $17 00@00 00; Southern Strong No. 2 Foundry, $16 50@00 00; Alabama Car Wheel, $22 00@22 50; Hanging Rock Charcoal, $23 00@24 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 25@14 50; Southern coke No. 2, $13 75@14 00; Southern coke No. 3, $13 25@13 50; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 50@17 00; Southern charcoal, No. 2, $16 00@16 50; Missouri charcoal, No. 1, $17 50@18 00; Missouri charcoal, No. 2, $17 00@17 50. FORGE—Neutral coke, $12 50@13 00; Cold short, $12 50@13 00; Mottled, $12 00@12 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $21 00@22 00; Southern (other brands), $17 50@18 00; Lake Superior, $21 50@22 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@15 75; Southern Coke No. 2, $14 50@14 75; Southern Coke No. 3, $13 75@14 25; Southern Grey Forge, $13 50@13 75; Southern Charcoal No. 1, $17 50@18 00; Southern Charcoal No. 2, $17 00@17 50; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $20 00@20 50; Southern, $19 00@21 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $0 00.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $18 50@19 00; Lake Superior (coke) Bessemer, $18 00@18 50; Katahdin (Maine charcoal), $23 50@24 00; Lake Superior Coke, Foundry, all ore, $18 00@18 50; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $18 00@18 50; Southern No. 1 $16 25@16 75; Southern Gray Forge, $14 75@15 25; Jackson County (Ohio) Silvery, $18 25@18 75; Old Car Wheel, $00 00@00 00. Connellsville Coke, $4.65.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 50@15 00; Southern Coke No. 2 Foundry $13 75@14 25; Southern Coke No. 3 Foundry $13 25@13 75; Grey Forge, $12 75@13 25; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $16 00@17 00; Car Wheel, $17 00@20 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $16 00@16 50; No. 2 Foundry, $15 00@15 50; Grey Forge, $14 00@14 25; White and Mottled, $13 25@13 50; Warm Blast Charcoal, $18 00@20 00; Cold Blast Charcoal $22 00@27 00; Bessemer, $16 00@16 50.

MERCHANT IRON AND STEEL.

Flat Bar

1½ to 4 by ⅛ to 1 inch	1 80
4½ to 6 by ⅛ to 1 inch	1 90
1½ to 6 by 1⅛ to 2 inch	2 20
1¼ & 1¾ by ⅛ to ¾ inch	1 90
1 & 1¼ by ⅛ to ¾ inch	2 00
⅛, ¼ and ⅜ by ⅛ to ½ inch	2 20

Round and Square.

1 to 1⅜ inch	1 80
1 to 2¾ inch	2 00
2⅜ to 3½ inch	2 10
3⅜ to 4 inch	2 80
4⅛ to 4½ inch	3 30
4¾ to 5 inch	3 50

Oval.

⅜ to 1¼ inch	2 20
⅜ to ¾ inch	2 40
½	2 60
⅝	3 00

Half Oval and Half Round.

1¼ to 3 inch	2 90
⅜ to 1¼ inch	2 50
⅜ to ¾ inch	3 10
⅝	3 30
¾	4 80

Heavy Band.

¼ to 6 by ¼ and 5-16 inch	2 00
¼ to 1¾ by ¼ and 5-16 inch	2 10
⅜ to ⅝ by ¼ and 5-16 inch	2 30
⅜ to ⅝ by ½ and 5-16 inch	3 80

Hoops.

1¼ to 4, Nos. 13 to 15	2 60
1¼ to 2, Nos. 16 to 18	2 70
1¼ to 2, No. 19	2 80
1¼ to 2, No. 20	2 90
1¼ to 2, No. 21	3 00
1¼ to 2, No. 22	3 10
15-16, 1 and 1⅛, Nos. 13 to 15	2 80
15-16, 1 and 1⅛, Nos. 16 to 18	2 90
15-16, 1 and 1⅛, Nos. 19 and 20	3 00
15-16, 1 and 1⅛, No. 21	3 10
15-16, 1 and 1⅛, No. 22	3 20
⅞, Nos. 13 to 15	3 00
⅞, Nos. 16 to 18	3 10
⅞, Nos. 19 and 20	3 20
⅞, No. 21	3 30
⅞, No. 22	3 40
13-16, Nos. 13 to 15	3 20
13-16, Nos. 16 to 18	3 30
13-16, Nos. 19 and 20	3 40
13-16, No. 21	3 50
13-16, No. 22	3 60
¾, Nos. 13 to 15	3 30
¾, Nos. 16 to 18	3 50
¾, Nos. 19 and 20	3 60
¾, No. 21	3 70
¾, No. 22	3 80
11-16, Nos. 13 to 15	3 50
11-16, Nos. 16 to 18	3 70
11-16, Nos. 19 and 20	3 80
11-16, No. 21	3 90
11-16, No. 22	4 00
⅝, Nos. 13 to 15	3 80
⅝, Nos. 16 to 18	4 00
⅝, Nos. 19 and 20	4 10
⅝, No. 21	4 20
⅝, No. 22	4 30
⅝, No. 23	4 50

Light Band.

1¾ to 6 by ⅛ to 3-16 in	2 20
1¾ to 6 by Nos. 11 and 12	2 30
1 to 1¾ by ⅛ to 3-16 in	2 40
1 to 1¾ by Nos. 11 and 12	2 50
⅞ and 13-16 by ⅛ to 3-16 in	2 70
⅞ and 1 3-16 by Nos. 11 and 12	2 80
¾ and 11-16 by ⅛ to 3-16 in	3 00
¾ and 11-16 by Nos. 11 and 12	3 10
⅝ and 9-16 by ⅛ to 3-16 in	3 30
⅝ and 9-16 by Nos. 11 and 12	3 40
½ by ⅛ to 3-16 in	3 60
½ by Nos. 11 and 12	3 70

Wagon Box Iron.

⅜ inch, beveled edge, by Nos. 11 and 12	2 80
⅜ inch, " " " 13 and 14	3 00
½ inch, " " " 11 and 12	3 10
½ inch, " " " 13 and 14	3 30

Sheet Iron:

No. 10 to 14	2 65
No. 15 to 17	2 75
No. 18 to 21	2 99
No. 22 to 24	3 15
No. 25 to 26	3 30
No. 27	3 40
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 60
C No. 1, " "	2 85
C H No. 1 " "	3 10
C H Flange, " "	3 85
Extra Flange, "	4 35
Solid Fire Box "	5 10

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 75
Shell	3 15
Flange	3 45
Marine Flange	3 85
Fire Box	4 55

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1¼c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅜ and 2⅜ to 3 in	10½
3⅛ to 4 in	11
⅜ to 11-16 and 4⅛	10½
⅛ to 6 in	11½
¼ to 9-32 and 6⅛ to 7 in	12
3-6 in	14

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅛ thick	9

Bessemer and O. H. Steel.

Machinery	base price,	2 75
Tire	"	2 75
Spring	"	3 25
Sleigh Shoe	"	2 75
Toe Calk	"	3 00
Cutter Shoes, tapered and burr.	"	3 00

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¼ inches diameter	4 00
Bridge ⅛, ⅜, 11-16 and ¼ inch diam	4 00

SCRAP IRON AND OLD METAL.

NET TONS	
No. 1 R. R. wrought scrap	$19 00
No. 1 wrought scrap	17 00
No. 1 Machine cast scrap	12 00
Iron axles	24 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
Cast borings	8 00
Uncut wrought iron boilers	11 00
Steel boiler plates	17 00
Grate Bars	8 00
Pipes and flues (Clean)	13 50
Tank iron	13 50
Hoop and band iron	10 00
Sheet iron	9 50
Wrought drillings	11 00
Malleable iron	10 00

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

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CORRESPONDENCE SOLICITED

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Ball-Norton (Monarch) Electro Magnetic Separator.

Phosphorus, sulphur, silica, hornblende and other impurities eliminated from Iron Ore, and non-Bessemer ore converted into Bessemer Ore. Samples treated without charge. Correspondence solicited.

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AND METALS.

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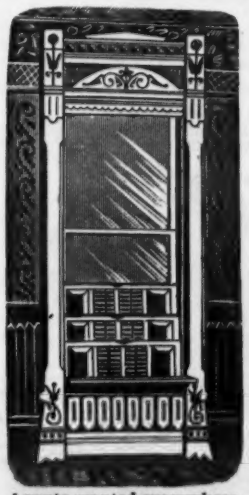

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MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 12

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single, ...dis 40
Shults Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 12

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¾".....dis 50&10
Morse Taper and Straight shank Larger than 1¾".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
¼ kegs ₩ lb	4¼c	5¼c		2¾c
½ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 50
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5¾	4½	4	3½	3⅛
Hexagon	15¾	11¼	8¾	6	5¼	5¼	5
Washers	9	8	7	5	4½	4¼	4⅛

In lots less than 100 lbs, ₩ lb add ¼c., lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
Car lots.....$2.30
Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $5.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 13¼
Sisal, ½ inch and over.....₩ lb 12½

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@45
" Band.....dis 30
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅜ lb Balls		21c@29c
No. 18 " " ¼ and ⅜ "		18c@28c
No. 36 " " ¼ and ⅜ "		16c@27c
2-Ply Hemp, ¼ & ⅜ lb Balls (Spring Twine)		11½c
3-Ply " 1 lb Balls		12@12½c
3-Ply " 1¼ lb Balls		11@11½c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

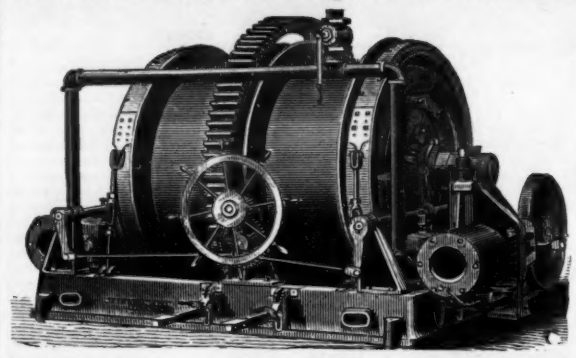
New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 3

Wrenches.

Coe's genuine, ...dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis 50

Webster, Camp & Lane Machine Co.



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Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

Wire Rope Haulage Machinery,

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Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.

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For Mechanical purposes.

256-260 DEVONSHIRE STREET, BOSTON.

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IRON CASTINGS.

DAILY MELTING CAPACITY 75 TONS—SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.

DUPLICATE WORK A SPECIALTY

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Detachable Roller and Chain Belting,

CHAIN.

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Malleable Iron and Steel,

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For handling materials of all kinds.

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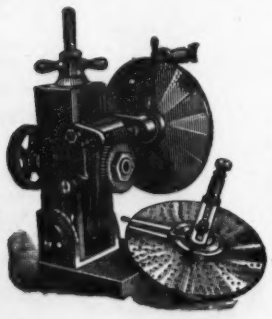

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STEAM BOILER FURNACE IN THE WORLD.
SEND FOR DESCRIPTIVE PAMPHLET. THE BRIGHTMAN STOKER CO. 201-203 RIVER ST. CLEVELAND, OHIO.

HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₰ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₰ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....₰ doz $8 00
Others.....₰ doz $7 00
Full polished.....₰ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 75&10
Tire, common, new list.....dis 65
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&10
Loose joint, jap.....dis 70&10
Loose joint, jap. with acorns.....dis 70&10
Loose pin, acorns.....dis 70&10
Loose pin, japanned acorns.....dis 70&10
Loose pin, acorns, jap. plated tips.....dis 70&10
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10
Wrought, fast joint, broad.....dis 70&10
Wrought, loose joint, broad.....dis 70&10
Table Butts, back flaps, etc.....dis 70&10
Regular inside blind.....dis 70&10
Light inside blind.....dis 70&10
Loose pin.....dis 70&10
Light loose pin.....dis 70&10

Carbonized Felt and Building Papers.

(POWERVILLE BRAND.)

	Per roll of 500 sq. feet.
Eberts Bros., Detroit.	
No. 1—Slaters'	$1.25
"A," Stringed Roofing, Light	1.50
"B," Stringed Roofing, Medium	1.75
"C," Stringed Roofing, Heavy	2.00
Stringed, Rosin-Sized	1.00

MILCELLANEOUS.

Asphaltum, Trinidad Refined, ₰ ton.....$30.00
Asphaltum, Fine Grade, ₰ lb.....08
Coal Tar Felt, 1 Ply, ₰ lb.....02
Coal Tar Felt, 2 Ply, ₰ roll 108 sq ft.....1.42½
Coal Tar Felt, 3 Ply, ₰ roll 108 sq ft.....1.85
Roofing Pitch, ₰ gal.....09

Chains.

Revised List.

Trace, 6¼-10-2.....₰ pair 1.03
Trace, 6¼-10-3.....₰ pair .92 } .....50&10
Trace, 7-10-2.....₰ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....₰ lb 5¾@6
Jack Chain, Iron.....dis 75&10
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	.....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
ars. slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed			
8 inch	4 00	4 50	5 00
10 and 11¼ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White corated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₰ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 33—
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

No.	10	9	8	7	6	
Ausable, ₰ lb.	23	24	25	26	28	dis 40
Putnam, ₰ lb.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....₰ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₰ keg $4 00
Mule Shoes, at factory.....₰ keg $5 00

Knobs.

Carriage, japanned.....₰ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60&10
Escutcheons and keys.....dis 60&10
Padlocks and padlock keys.....dis 75
Bell pulls, mineral, porcelain and jet dis 60&10
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs. genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 50
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....₰ gross $4.80

Plumbs and Leve s.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....₰ doz $6 00
Bishop's O K.....₰ doz $5 25
Bishop's Pioneer.....₰ doz $3 75
Bishop's American.....₰ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$6....dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....₰ gross $15 00

Scales.

Hatch, Counter, No. 171.....₰ doz $21 00
Hatch, Tea, No. 161.....₰ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₰ doz $18 dis 25

Squares.

Steel and iron, Nickel plated } dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 77½&10
Steel carpet tacks all kinds.....dis 75&10
Swedes iron carpet tacks, all kinds dis 75&10
Swedes iron tacks.....dis 75&10
Swedes iron Upholsterers' tacks.....dis 75&10
Tinned Swedes iron tacks.....dis 77½&10
Tinned Swedes iron Upholsterers' tacks.....dis 77½&10
American iron cut tacks.....dis 77½&10
Copper tacks.....dis 4c&10
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 50&10
Finishing nails.....dis 60&10
Hungarian nails and miners' tacks...dis 60&10
Gimp and lace tacks.....dis 77½&10
" " " tinned.....dis 60&10
Trunk and clout nails.....dis 72½&10
Tinned trunk&clout nails.....dis 66&10
Basket nails.....dis 66&10
Chair nails.....dis 66&10
Common and patent brads.....dis 66&10

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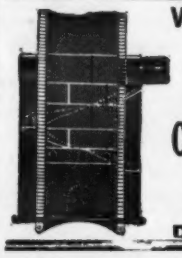

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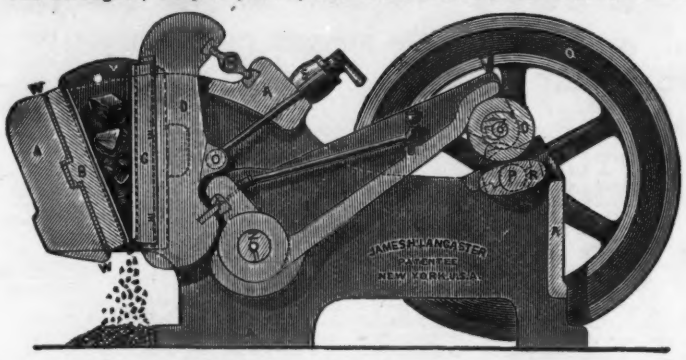

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Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom.....		†4 30 p m
Pittsburgh Express.....	‡1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

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(Standard Gauge.)

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Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—
Zanesville and Coshocton—10:30 a. m., 6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.
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FOR AKRON, CANTON AND MARIETTA.
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Balto. & Wash. Express....	*4 00 p m	*10 25 a m
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For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	7 45 a m	d5 25 a m
	1 15 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
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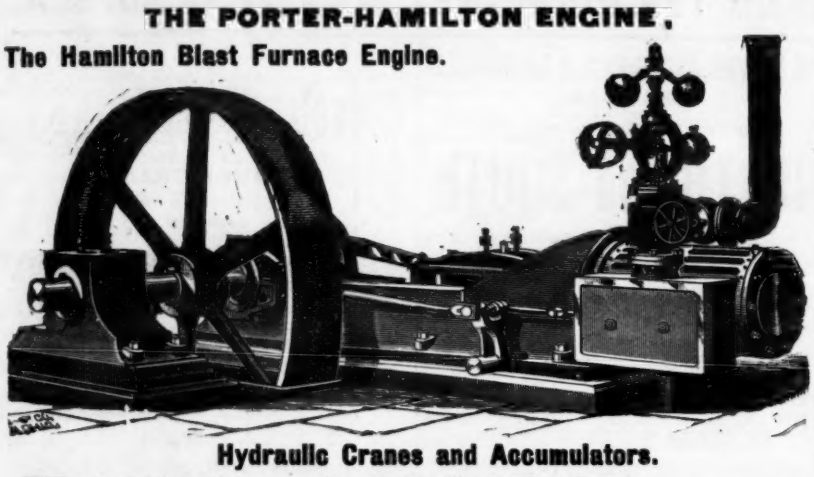

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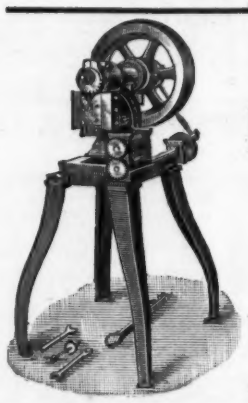

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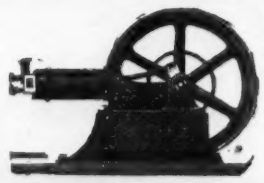

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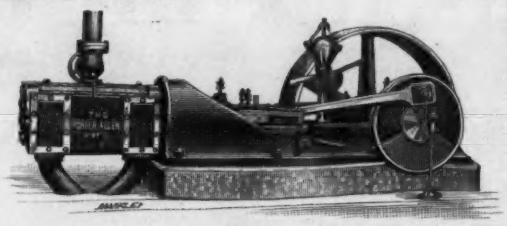

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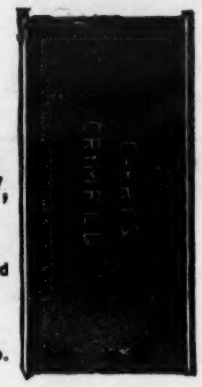

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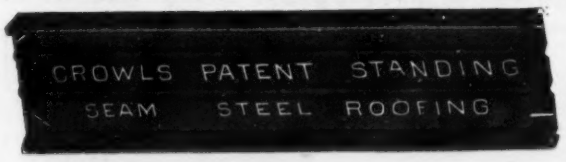

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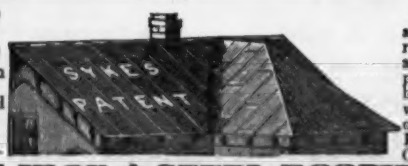

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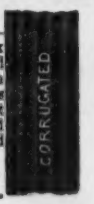

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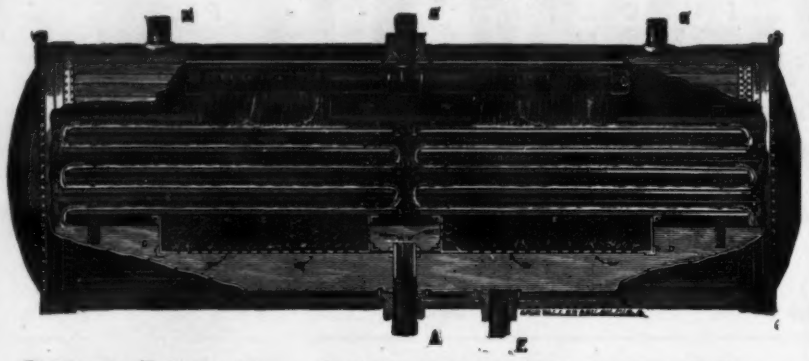

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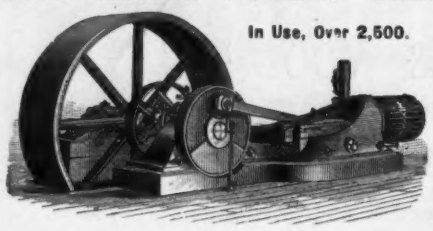

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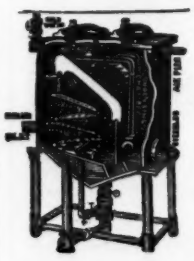

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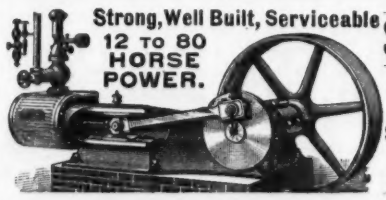

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